

VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE
STANKOIMPORT

OPENSIDE PLANERS
DOUBLE HOUSING PLANERS
PLATE EDGE PLANERS
SHAPERS
SLOTTERS
HORIZONTAL BROACHING MACHINES
COLD SAWING MACHINES
HACK SAWING MACHINES
DYNAMIC BALANCING MACHINES



VSESOUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

STANKOIMPORT

U S S R

MOSCOW

This catalogue contains short specifications of the most common types of machine tools exported by the Vsesojuznoje Exportno-Importnoje Objedinenije "Stankoimport".

Detailed pamphlets sent on request.

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The Machine Tools produced in the USSR are outstanding for their high efficiency, convenience and safety in operation and long service.

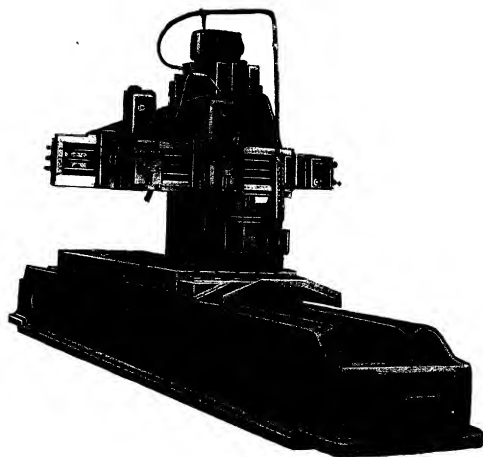
The first class material, perfect modern design and skilful workmanship provide accuracy, high efficiency and durability of the Machine Tools.

Steady improvement of machine tool design in the USSR aims at the increase of productivity, accuracy, reliability and dependability of machine in operation, as well as the reduction of operator's fatigue by improving and convenient placing of all operating controls and the all-increasing automatization of operation.

The Vsesojuznoje Exportno-Importnoje Objedinenije "Stanko-import" is able to offer a wide range of Machine Tools both universal and special types including Automatic Transfer Machines and Automatic Workshops.

OPENSIDE PLANER

MODEL 7134



The 7134 Planer is designed for planing large parts (castings or forgings) weighing up to 5 tons. Work pieces with a width greater than 1000 mm can be set on the table of the machine, but the maximum width planed is 1000 mm.

Flat and Vee ways of tables and beds, T-slots as well as vertical and inclined planes can be machined.

Two surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and one side head on the upright.

Table drive is by a D.C. electric motor, and table speeds are infinitely variable through a motor-generator system.

СТАНКОИМПОРТ

The reciprocating motion of the table is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;
- Slowing down speed before end of cut;
- Rapid table return.

The vertical tool heads are provided with power feeds both in the horizontal and vertical directions; the side tool head is provided with power feeds in the vertical direction and hand feeds in the horizontal.

Feeds and set-up travel of the vertical and side heads are obtained by separate electric motors.

The sliding ways and table driving mechanisms are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station.

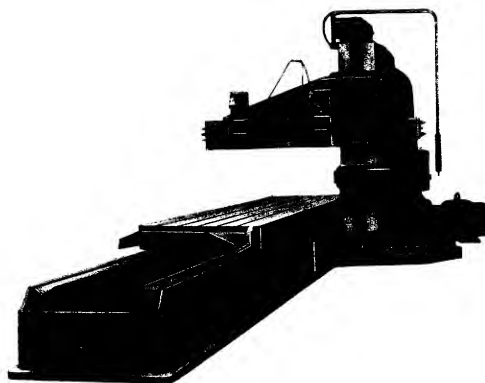
The machine is provided with automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

Capacity		Range of vertical feeds of side head per table stroke, mm	
Distance from table to vertical tool head, mm:		Speed of rapid power traverse, m/min.	0.25—12.5
Minimum	0	Vertical heads	2.33
Maximum	870	Side head	1.07
Minimum distance between axes of vertical heads, mm	290	Power travel of cross rail, m/min.	0.5
Maximum distance from axis of left vertical head to column, mm	1070	Drive	
Maximum extension of side and vertical tool heads, mm	265	Number of electrical units	12
Maximum width planed, mm	1000	Motor-generator unit:	
Maximum height planed, mm	850	Power of asynchronous motor, kW	40
Maximum length planed, mm	3000	Speed, r. p. m.	1500
Maximum weight of work piece admitted, kg	5000	Head feed motors:	
Table		Power, kW	1.7
Working surface of table, mm	3000 × 900	Speed, r. p. m.	1500
Number of T-slots	5	Cross rail elevating motor:	
Width of T-slots, mm	28	Power, kW	2.8
Distance between slots, mm	150	Speed, r. p. m.	1500
Speeds and Feeds		Cross rail clamping motor:	
Range of table cutting speeds, m/min.	5—75	Power, kW	0.6
Range of table return speeds, m/min.	15—75	Speed, r. p. m.	1500
Range of feeds of vertical heads per table stroke, mm:		Space Occupied	
Vertical	0.125—6.2	Floor space, mm	7495 × 3275
Horizontal	0.5—25	Height of machine, mm	2890
		Weight	
		Net weight, kg	approx. 20000

OPENSIDE PLANER

MODEL 7142 A



The 7142 A Planer is designed for planing large parts (castings or forgings) weighing up to 10 tons. Work pieces with a width greater than 1500 mm can be set on the table of the machine, but the maximum width planed is 1500 mm.

Flat and Vee ways of tables and beds, T-slots as well as vertical and inclined planes can be machined.

Two surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and one side head on the upright.

Table drive is by a D.C. electric motor, and table speeds are infinitely variable through a motor-generator system.

The reciprocating motion of the table is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;

СТАНКОИМПОРТ

Slowing down speed before end of cut;

Rapid table return.

The vertical tool heads are provided with power feeds both in the horizontal and vertical directions; the side tool head is provided with power feeds in the vertical direction and hand feeds in the horizontal.

Feeds and set-up travel of the two vertical and side heads are obtained by separate electric motors.

The sliding ways and table driving mechanisms are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station.

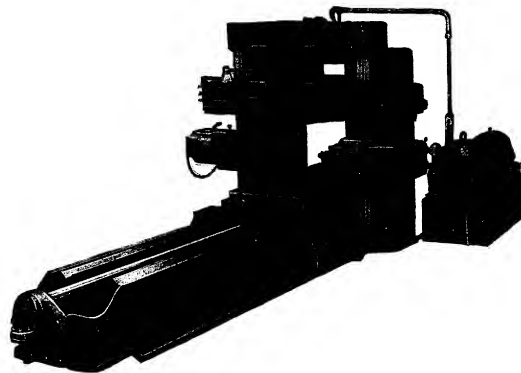
The machine is provided with automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

Capacity		Range of vertical feeds of side head per table stroke, mm . . .	0.25—12.5
Distance from table to vertical tool head, mm:		Speed of rapid power traverse, m/min:	
Minimum	0	Vertical heads	2.33
Maximum	1270	Side head	1.07
Minimum distance between axes of vertical heads, mm . . .	290	Power travel of cross rail, m/min,	0.65
Maximum distance from axis of left vertical head to column, mm	1525	Drive	
Maximum extension of side and vertical tool heads, mm . .	265	Number of electrical units . . .	12
Maximum width planed, mm . .	1500	Motor-generator unit:	
Maximum height planed, mm . .	1250	Power of asynchronous motor, kW	40
Maximum length planed, mm . .	6000	Speed, r. p. m.	1500
Maximum weight of work piece admitted, kg	10000	Head feed motors:	
Table		Power, kW	1.7
Working surface of table, mm 6000 x 1250		Speed, r. p. m.	1500
Number of T-slots	5	Cross rail elevating motor:	
Width of T-slots, mm	28	Power, kW	4.5
Distance between slots, mm . .	210	Speed, r. p. m.	1500
Speeds and Feeds		Cross rail clamping motor:	
Range of table cutting speeds, m/min,	6—60	Power, kW	0.6
Range of table return speeds, m/min,	15—60	Speed, r. p. m.	1500
Range of feeds of vertical heads per table stroke, mm:		Space Occupied	
Vertical	0.125—6.2	Floor space, mm	13380 x 4010
Horizontal	0.5—25	Height of machine, mm	3600
		Weight	
		Net weight, kg	approx. 40000

DOUBLE HOUSING PLANER

MODEL 7231



The 7231 Hydraulic Planer is designed for planing large parts (castings and forgings) weighing up to 5 tons. Flat and Vee ways of tables and beds, T-slots as well as vertical and inclined planes can be machined.

Two surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and one side head on the uprights.

The table is driven hydraulically. Forward and return table speeds are infinitely variable by means of a variable delivery pump.

The reciprocating motion of the machine table is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;
- Slowing down speed before end of cut;
- Rapid table return.

The vertical heads are provided with power feeds both in the horizontal and vertical directions; the side heads are provided with power feeds in the vertical direction and hand feeds in the horizontal.

Feeds and set-up travel of the two vertical and each of the side heads are obtained by separate electric motors.

The sliding ways are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station.

The machine is provided with automatic interlocking devices for preventing engagements that may lead to breakages.

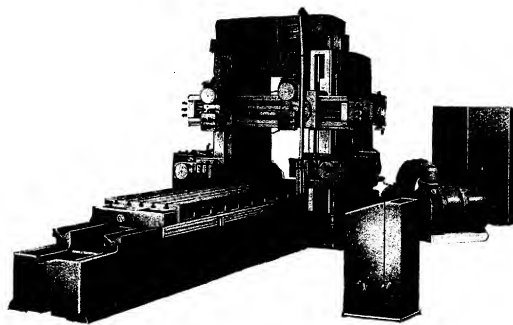
SPECIFICATIONS

Capacity		Speed of rapid power traverse, m/min.	
Distance from table to vertical tool heads, mm:		Vertical heads	2.33
Minimum	0	Side heads	1.07
Maximum	890	Power travel of cross rail, m/min.	0.5
Distance between axes of vertical tool heads, mm:			
Minimum	290	Hydraulic Pump	
Maximum	1470	Maximum delivery of pump, liters per min.	400
Maximum extension of side and vertical tool heads, mm	265	Maximum pressure, atm	100
Maximum width planed, mm .	1000		
Maximum height planed, mm .	850	Drive	
Maximum length planed, mm .	3000	Number of electrical units	7
Maximum weight of work piece admitted, kg	5000	Head feed motors:	
		Power, kW	1.7
		Speed, r. p. m.	1500
Table		Cross rail elevating motor:	
Working surface of table, mm	3000 x 900	Power, kW	1.7
Number of T-slots	5	Speed, r. p. m.	1500
Width of T-slots, mm	28	Cross rail clamping motor:	
Distance between slots, mm .	150	Power, kW	0.6
		Speed, r. p. m.	1500
Speeds and Feeds		Hydraulic pump driver:	
Range of table cutting speeds m/min.	8—75	Power, kW	28
Range of table return speeds, m/min.	8—75	Speed, r. p. m.	1000
Range of feeds of vertical tool heads per table stroke, mm:		Space Occupied	
Vertical	0.125—6.2	Floor space, mm	7870 x 3245
Horizontal	0.5—25	Height of machine, mm	2680
Range of vertical feeds of side tool heads per table stroke, mm	0.25—12.5	Weight	
		Net weight, kg	approx. 22000

СТАНКОИМПОРТ

DOUBLE HOUSING PLANER

MODEL 7231A



The 7231-A Planer is designed for planing large parts (castings and forgings) weighing up to 5 tons.

Flat and Vee ways of tables and beds, T-slots as well as vertical and inclined planes can be machined.

Two surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and one side head on the uprights.

Table drive is by a D.C. electric motor and table speeds are infinitely variable through a motor-generator system.

The reciprocating motion of the machine table is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;
- Slowing down speed before end of cut;
- Rapid table return.

The vertical heads are provided with power feeds both in the horizontal and vertical directions; the side heads are provided with power feeds in the vertical direction and hand feeds in the horizontal.

СТАНКОИМПОРТ

Feeds and set-up travel of the vertical and each of the side heads are obtained by separate electric motors.

The sliding ways and table driving mechanisms are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station.

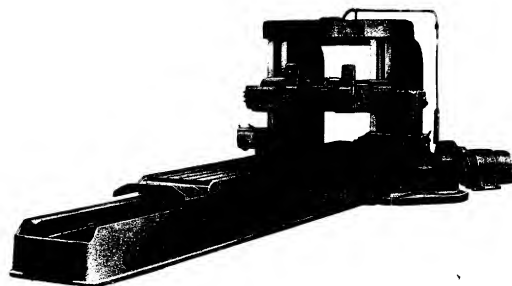
The machine is provided with automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

Capacity		Range of vertical feeds of side tool heads per table stroke, mm	
Distance from table to vertical tool head, mm:			0.25--12.5
Minimum	0	Speed of rapid power traverse, m/min:	
Maximum	890	Vertical heads	2.33
Distance between axes of vertical tool heads, mm:		Side heads	1.07
Minimum	290	Power travel of cross rail, m/min:	0.5
Maximum	1470		
Maximum extension of side and vertical tool heads, mm	265	Drive	
Maximum width planed, mm	1000	Number of electrical units	13
Maximum height planed, mm	850	Motor-generator unit:	
Maximum length planed, mm	3000	Power of asynchronous motor, kW	40
Maximum weight of work piece admitted, kg	5000	Speed, r.p.m.	1500
Table		Head feed motors:	
Working surface of table, mm	3000 × 900	Power, kW	1.7
Number of T-slots	5	Speed, r.p.m.	1500
Width of T-slots, mm	28	Cross rail elevating motor:	
Distance between slots, mm	150	Power, kW	1.7
Speeds and Feeds		Speed, r.p.m.	1500
Range of table cutting speeds, m/min	5--75	Cross rail clamping motor:	
Range of table return speeds, m/min	15--75	Power, kW	0.6
Range of feeds of vertical tool heads per table stroke, mm:		Speed, r.p.m.	1500
Vertical	0.125--6.2	Space Occupied	
Horizontal	0.5--25	Floor space, mm	7495 × 3685
		Height of machine, mm	2680
		Weight	
		Net weight, kg	approx. 22000

DOUBLE HOUSING PLANER

MODEL 7242 A



The 7242 A Planer is designed for planing large parts (castings and forgings) weighing up to 10 tons.

Flat and Vee ways of tables and beds, T-slots as well as vertical and inclined planes can be machined.

Two surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and one side head on the uprights.

Table drive is by a D.C. electric motor and table speeds are infinitely variable through a motor-generator system.

The reciprocating motion of the table is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;
- Slowing down speed before end of cut;
- Rapid table return.

The vertical heads are provided with power feeds both in the horizontal and vertical directions; the side heads are provided with power feeds in the vertical direction and hand feeds in the horizontal.

Feeds and set-up travel of the two vertical and each of the side heads are obtained by separate electric motors.

СТАНКОИМПОРТ

The sliding ways and table driving mechanisms are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station.

The machine is provided with automatic interlocking devices for preventing engagements that may lead to breakages.

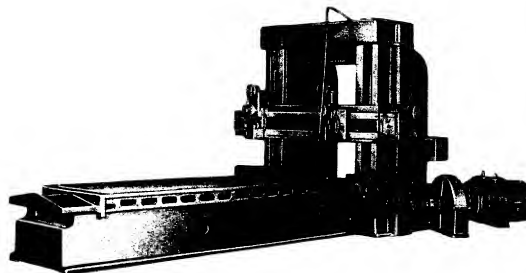
SPECIFICATIONS

Capacity		Range of vertical feeds of side heads per table stroke, mm	0.25—12.5
Distance from table to vertical tool head, mm:		Speed of rapid power traverse, m/min.:	
Minimum	0	Vertical heads	2.33
Maximum	1270	Side heads	1.07
Distance between axes of vertical tool heads, mm:		Power travel of cross rail, m/min.	0.9
Minimum	230		
Maximum	1980	Drive	
Maximum extension of side and vertical tool heads, mm	265	Number of electrical units	13
Maximum width planed, mm	1500	Motor-generator unit:	
Maximum height planed, mm	1250	Power of asynchronous motor, kW	40
Maximum length planed, mm	6000	Speed, r. p. m.	1500
Maximum weight of work piece admitted, kg	10000	Head feed motors:	
		Power, kW	1.7
		Speed, r. p. m.	1500
Table		Cross rail elevating motor:	
Working surface of table, mm 6000 × 1250		Power, kW	4.5
Number of T-slots	5	Speed, r. p. m.	1500
Width of T-slots, mm	28	Cross rail clamping motor:	
Distance between slots, mm	210	Power, kW	0.6
		Speed, r. p. m.	1500
Speeds and Feeds		Space Occupied	
Range of table cutting speeds, m/min.	6—60	Height of machine, mm	3100
Range of table return speeds, m/min.	15—60	Floor space, mm	13390 × 4275
Range of feeds of vertical tool heads per table stroke, mm:		Weight	
Vertical	0.125—6.2	Net weight, kg	approx. 40000
Horizontal	0.5—25		

СТАНКОИМПОРТ

DOUBLE HOUSING PLANER

MODEL 724 M



The 724 M Planer is designed for planing large parts (castings or forgings) weighing up to 10 tons. Three surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and the two side heads on the uprights.

The drive to the table is by a separate variable speed motor controlled by the generator-motor system.

Power feeds and rapid traverse for all tool heads are actuated by separate D. C. electric motors.

Clamping, unclamping and travel of the cross rail are operated by power. The principal mechanisms and sliding ways are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station and a control desk.

The machine is furnished with a safety device against overloads, and automatic interlocking devices for preventing engagements that may lead to breakages.

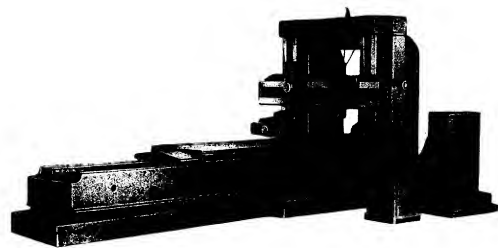
СТАНКОИМПОРТ

SPECIFICATIONS

Capacity		Range of vertical feeds of side heads per table stroke, mm.	0.5—50
Distance from table to vertical tool head, mm:		Rapid power traverse of slides, m/min.:	
Minimum	0	Saddle	3
Maximum	1300	Vertical tool slides	1.5
Extreme position of axis of slides of side tool heads, mm:		Power travel of cross rail, m/min.	1
Above table surface	1050		
Below table surface	200	Drive	
Maximum extension of vertical and side tool heads, mm	330	Number of electrical units	13
Length planed, mm	4000	Drive of converting unit:	
Width planed, mm	1500	Power, kW	72
Height planed, mm	1250	Speed, r.p.m.	1000
		D. C. feed drive motors (three):	
Table		Power, kW	1.75
Working surface of table, mm 4000 × 1300		Speed, r.p.m.	1450
Speeds and Feeds		Cross rail clamping motor:	
Range of cutting speeds of table, m/min.	6—60	Power, kW	1.0
Range of return speeds of table, m/min.	12—60	Speed, r.p.m.	1500
Number of feeds of vertical and side heads	21	Space Occupied	
Range of feeds of vertical heads per table stroke, mm:		Floor space, mm	9600 × 4300
Vertical feeds	0.25—25	Height of machine, mm	3550
Horizontal feeds	0.5—50	Weight	
		Net weight, kg	approx. 32000

DOUBLE HOUSING PLANER

MODEL 7256



The 7256 Planer is designed for planing large parts (castings or forgings) weighing up to 20 tons. Three surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and the two side heads on the uprights.

The drive to the table is by a separate variable speed motor controlled by the generator-motor system.

Power feeds and rapid traverse for all tool heads are actuated by separate A. C. electric motors.

Clamping, unclamping and travel of the cross rail are operated by power.

The principal mechanisms and sliding ways are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station and a control desk.

The machine is furnished with a safety device against overloads, and automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

Capacity		Extreme position of axis of slides of side tool heads, mm:	
Distance from table to vertical tool head, mm:		Above table surface	1280
Minimum	0	Below table surface	330
Maximum	1600		

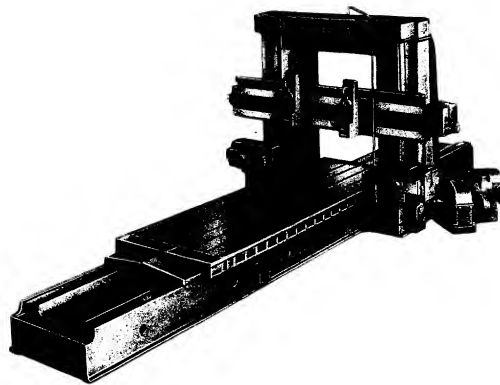
СТАНКОИМПОРТ

Distance between uprights, mm	2100	Converting unit:	
Maximum extension of vertical and side tool heads, mm	425	Motor:	
Length planed, mm	6000	Power, kW	115
Width planed, mm	2000	Speed, r.p.m.	1500
Height planed, mm	1500	D.C. generator:	
Maximum weight of work piece admitted, kg	20000	Power, kW	250
		Speed, r.p.m.	1470
		Exciter:	
		Power, kW	24
		Speed, r.p.m.	1460
		D.C. table drive motor:	
		Power, kW	40-70
		Speed, r.p.m.	100-1250
		Ventilation motor:	
		Power, kW	1.5
		Speed, r.p.m.	1450
		Speed stabilizer:	
		Motor:	
		Power, kW	0.65
		Speed, r.p.m.	3000
		Power of D.C. generator, kW	0.18
		D.C. feed drive motors (three):	
		Power, kW	2.8
		Speed, r.p.m.	1500
		Cross rail elevating motor:	
		Power, kW	7
		Speed, r.p.m.	1500
		Cross rail clamping motor:	
		Power, kW	0.8
		Speed, r.p.m.	1000
		Lubricating system motor:	
		Power, kW	1.0
		Speed, r.p.m.	1500
		Space Occupied	
		Floor space, mm	14000 x 5345
		Height of machine, mm	4160
		Weight	
		Net weight, kg	approx. 58150
		Drive	
		Number of electrical units	15

СТАНКОИМПОРТ

DOUBLE HOUSING PLANER

MODEL 7278



The 7278 Planer is designed for planing large parts (castings or forgings) weighing up to 45 tons. Three surfaces on one work piece can be machined simultaneously by the two vertical tool heads on the cross rail and the two side heads on the uprights.

The drive to the table is by a separate variable speed motor controlled by the generator-motor system.

Power feeds and rapid traverse for all tool heads are actuated by separate A.C. electric motors.

Clamping, unclamping and travel of the cross rail are operated by power. The principal mechanisms and sliding ways are automatically lubricated by an oil pump.

The machine is controlled from a pendant push-button station and a control desk.

СТАНКОИМПОРТ

The machine is furnished with a safety device against overloads, and automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

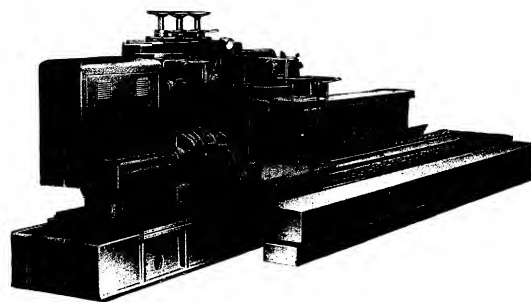
Capacity		Range of feeds of side heads per table stroke, mm:	
Distance from table to vertical tool head, mm:		Vertical feeds	0.5—100
Minimum	0	Horizontal feeds	0.25—100
Maximum	2500	Maximum speed of rapid power traverse, m/min.:	
Extreme position of axis of slides of side tool heads, mm:		Saddle	2.5
Above table surface	2165	Tool slides	1.25
Below table surface	395	Power travel of cross rail, m/min.	0.42
Distance between uprights, mm	3100	Drive	
Maximum extension of vertical and side tool heads, mm	525	Number of electrical units	14
Length planed, mm	8000	Drive of converting unit:	
Width planed, mm	3000	Power, kW	115
Height planed, mm	2500	Speed, r.p.m.	1500
Table		D.C. table drive motor:	
Working surface of table, mm 8320 × 2700		Power, kW	60—100
		Speed, r.p.m.	125—1250
		D.C. feed drive motors (three):	
		Power, kW	4.5
		Speed, r.p.m.	1500
		Cross rail elevating motor:	
		Power, kW	14
		Speed, r.p.m.	1500
		Cross rail clamping motor:	
		Power, kW	1.7
		Speed, r.p.m.	1000
		Space Occupied	
		Floor space, mm	18600 × 7030
		Height of machine, mm	6250
		Weight	
		Net weight, kg	approx. 119800

Speeds and Feeds

Range of cutting speeds of table, m/min.	5—50
Range of return speeds of table, m/min.	12—50
Number of feeds of vertical and side heads	24
Range of feeds of vertical heads per table stroke, mm:	
Vertical feeds	0.25—50
Horizontal feeds	0.5—100

PLATE EDGE PLANER

MODEL 7806



The 7806 Plate Edge Planer is designed for planing edge on sheet metal parts up to 200 mm in thickness.

Metal parts with a width greater than 1500 mm can be machined provided they are supported at the free end by a special supporting device.

Besides straight edge planing a wide range of form planing operations can be carried out on sheet metal parts.

Planing is effected through the movement of the carriage in both directions of its traverse. The reciprocating motion of the carriage is carried out in the following automatic cycle:

- Slow speed at the beginning of cut;
- Increasing cutting speeds up to the predetermined speed;
- Slowing down speed before end of cut;
- Reverse motion of carriage to starting position.

Drive to the carriage is from a D.C. electric motor, housed in the carriage. Motor speeds are infinitely variable through a motor-generator system.

The machine is provided with two tool slides mounted opposite each other. Both slides have power feeds in the vertical and horizontal directions.

The sliding ways of the carriage and bed ways, as well as the main drive reduction gears are automatically lubricated by an oil pump.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The machine can be controlled from the carriage, as well as from the control desks.

The machine is provided with safety devices and light signals to prevent any breakages due to overloadings.

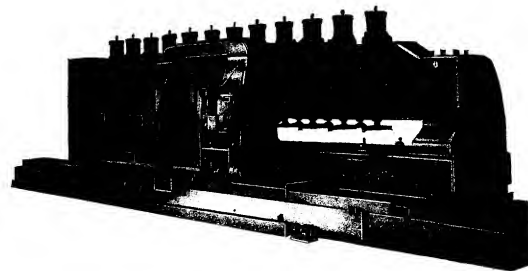
SPECIFICATIONS

Capacity		Speed of power set-up travel of slides, m/min:	
Maximum travel of carriage, mm	6700	Vertical	1.15
Maximum vertical travel of carriage slides, mm	430	Horizontal	0.6
Maximum horizontal travel of tool slide, mm	265	Drive	
Maximum swivel of tool holder	180°	Number of electrical units	10
Maximum length planed, mm	6000	Motor-generator unit:	
Maximum height (thickness) planed, mm	200	Power of asynchronous motor, kW	28
		Speed, r. p. m.	1500
Table		Feed box drive motors:	
Working surface of table, mm 6350 × 1800		Power, kW	1.7
		Speed, r. p. m.	1500
Speeds and Feeds		Space Occupied	
Range of carriage speeds, m/min	6—40	Floor space, mm	11310 × 3775
Range of feeds of slides per carriage stroke, mm:		Height of machine, mm	2600
Vertical	0.5—12.5	Weight	
Horizontal	0.25—6.2	Net weight, kg	approx. 28000

СТАНКОИМПОРТ

PLATE EDGE PLANER

MODEL 728 A



The 728 A Planer is designed for planing edge on sheet metal parts from 250 to 500 mm in thickness. Provision can be made for accommodating sheet metal parts from 25 to 250 mm by supplementary clamping attachments, which, if desired, can be supplied on special order.

Planing is effected through the movement of the carriage in both directions of its traverse.

On the carriage is mounted a portal with two slides, and during the cutting operation it travels relatively to the stationary table with the work piece clamped on it. Owing to a swivelling arm, edges can be chamfered at different angles.

Sheet clamping is effected by pneumatic clamps; the machine is also provided with supplementary clamps and stops.

Drive to the carriage, feed mechanisms and slides is from a D. C. electric motor.

The carriage speeds are infinitely variable.

The sliding ways and carriage mechanisms are automatically lubricated by two oil pumps.

The machine is controlled from a pendant push-button station or control desk.

СТАНКОИМПОРТ

To the machine are added removable slides by the help of which it is possible to perform various form planing operations.

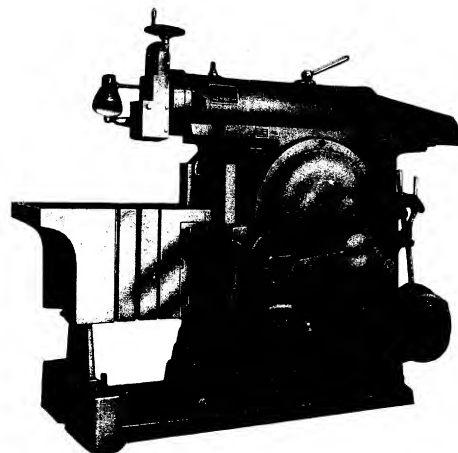
The machine is provided with safety devices against overloads, as well as automatic interlocking devices for preventing engagements that may lead to breakages.

SPECIFICATIONS

Capacity		Main drive D. C. electric motor:	
Maximum length planed, mm	12000	Power, kW	40
Maximum width of sheet, mm	3500	Speeds, r.p.m.	500—1500
Thickness of sheet planed, mm:		Portal travel setting D. C. motor:	
Maximum	500	Power, kW	4.4
Minimum	250	Speed, r.p.m.	1500
Travel of carriage, mm:		Slide feed D. C. motors (two):	
Minimum	2000	Power, kW	1.75
Maximum	12500	Speed, r.p.m.	1450
Pneumatic clamping force on sheet, kg	72000	Arm swivel D. C. motors (two):	
		Power, kW	2.8
		Speed, r.p.m.	1500
		Tool lifter D. C. motors (two):	
		Power, kW	0.52
		Speed, r.p.m.	1450
		Coolant pump D. C. motor:	
		Power, kW	0.52
		Speed, r.p.m.	1450
		Channel emulsion feed asynchronous motor:	
		Power, kW	2.8
		Speed, r.p.m.	3000
		Space Occupied	
		Floor space, mm	22840 × 6320
		Height of machine, mm	4360
		Weight	
		Net weight, kg	approx. 157000
Drive			
Number of electric units	10		
Total power required, kW	58		

CRANK SHAPER

MODEL 736



The 736 Shaper is designed for surfacing and finishing irregular shaped pieces as well as flat work that requires slotting or grooving.

The ram of the machine with the tool head is actuated by a rocker arm mechanism.

The tool head may be swivelled in a vertical plane. The vertical feed of the tool slide is effected by hand.

The work table has both hand and power horizontal traverse, while vertical traverse is by hand only.

The automatic horizontal feed of the work table is actuated by a ratchet mechanism.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

The machine is driven by a separate electric motor, starting and stopping being effected through a push-button station.

The following accessories can be supplied on special order: a universal table, a mechanism for automatic vertical feed of tool slide and an automatic tool lifter.

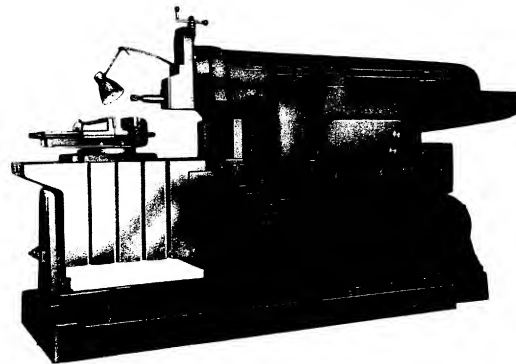
SPECIFICATIONS

Capacity		Maximum swivel of tool head (each side of center)		± 60°
Length of ram stroke, mm:		Note: ± 60° swivel is allowed when clearance between tool head and bed guides is not less than 10 mm. In all other cases swivel of ± 20° is allowed.		
Minimum	95			
Maximum	650	Speeds and Feeds		
Distance from lower edge of ram to table, mm:				
Minimum	65	Number of ram double strokes per minute — 12.5; 17.9; 25; 36.5; 52.5; 73		
Maximum	370	Table horizontal feeds, mm per double stroke of ram:		
Maximum distance from tool bottom to bed, mm	700	Minimum (per 1 tooth of ratchet)	0.33	
		Maximum (per 10 teeth of ratchet)	3.33	
Table		Drive		
Working surface of table, mm:				
Top	650 × 450	220-380 volt, 3 phase, 50 cycle		
Side	450 × 400	A.C. motor:		
Saddle of table	450 × 420	Power, kW	4.5	
Maximum table traverse, mm:		Speed, r.p.m.	1000	
Horizontal (power and hand)	600	Space Occupied		
Vertical (by hand)	300			
Ram and Tool Head		Floor space, mm		2830 · 1450
Maximum adjustment of ram (each side of center), mm	± 250			Height of machine, mm . . . . .	1750
Maximum swivel of tool holder (each side of center)	± 20	Weight		
Maximum size of tool shank, mm	20 × 30			
Maximum vertical travel of tool slide (by hand), mm	175	Net weight, kg	approx. 1975	

СТАНКОИМПОРТ

HYDRAULIC SHAPER

MODEL 737



The 737 Shaper is designed for machining flats and irregular shaped pieces in small lot production.

The machine incorporates hydraulic travel of ram and hydraulic feed of table at each stroke of ram. Horizontal and vertical rapid traverse of table is actuated by separate electric motor.

Length and position of ram stroke are regulated by adjustable stops.

Speeds and feeds are stepless variable.

The machine is controlled through a push-button station.

The following accessories can be supplied on special order: a universal table, a mechanism for automatic vertical feed of tool slide, and an automatic tool lifter.

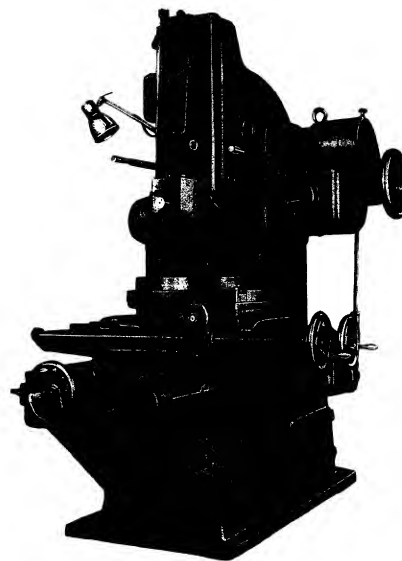
СТАНКОИМПОРТ

SPECIFICATIONS

Capacity		Speeds and Feeds	
Maximum length of stroke, mm	900	Range of ram speeds, m/min.	3-37
Maximum distance, ram to table, mm	400	Range of table feeds per ram stroke, mm	0-5
Maximum distance, tool to column, mm	1025	Rapid power traverse of table, m/min:	
		Horizontal	2.58
		Vertical	0.14
Table		Drive	
Working surface of table, mm:		220 380 volt, 3 phase, 50 cycle	
Length	900	A.C. motors:	
Width	450	Main drive:	
Maximum travel of table (power or hand), mm:		Power, kW	10
Horizontal	850	Speed, r.p.m.	1000
Vertical	320	Rapid power traverse:	
		Power, kW	1.0
		Speed, r.p.m.	1500
Tool Slide		Space Occupied	
Maximum size of tool shank accommodated, mm:		Floor space, mm	3280 x 1710
Width	30	Height of machine, mm	1740
Height	45		
Maximum vertical travel of tool slide, mm	200	Weight	
Maximum swivel of tool head	60°	Net weight, kg	approx. 4000

SLOTTER

MODEL 7417



The 7417 Slotter is designed for cutting flat and irregular shapes, keyways, for machining dies, and for a variety of other production and tool-room works.

The machine is started through a friction clutch.

The rotary table is mounted on a carriage which travels horizontally in longitudinal directions on a saddle which in turn moves transversely on the ways of the base.

Like carriage and saddle, table has hand adjustment and power rapid traverse in either direction.

The ram may be tilted forward any amount up to 10°.

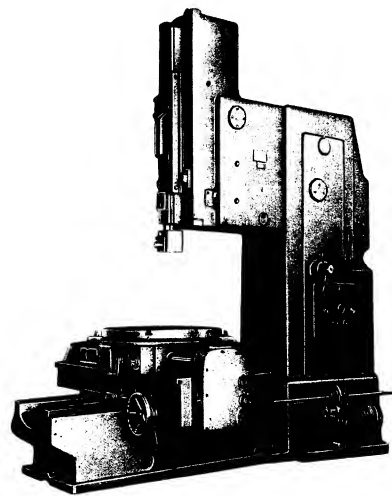
A pendant gives the operator complete and continuous control of all machine movements from any working position.

SPECIFICATIONS

Capacity		Speeds and Feeds	
Stroke of ram, mm:		Range of ram speeds (hydraulic), m/min.	5—16
Minimum	125	Range of table feeds per one stroke of ram (infinite), mm:	
Maximum	380	Longitudinal	0—1.25
Maximum height of work admitted, mm	500	Cross	0—2.5
Maximum diameter of work admitted, mm	700	Range of rotary table feeds per one stroke of ram	0—2
Distance, tool post seat to column, mm	560	Drive	
Distance top of table to ram ways, mm	420	220/380 volt, 3 phase, 50 cycle A. C. motors:	
Maximum cutting pressure, kg	1600	Main drive:	
		Power, kW	7
		Speed, r. p. m.	1500
		Rapid traverse:	
		Power, kW	1.7
		Speed, r. p. m.	1500
Table		Space Occupied	
Rotary table diameter, mm	650	Floor space, mm	2500 × 1990
Maximum travel of table, mm:		Height of machine, mm	2670
Longitudinal	635		
Cross	635		
Ram		Weight	
Maximum forward inclination of tilting ram-guide	10°	Net weight, kg	approx. 4825

HYDRAULIC SLOTTER

MODEL 7450



The 7450 Hydraulic Slotter is designed for cutting flat and irregular shapes, key-ways, for machining dies, and for variety of other production and tool-room works.

The machine has hydraulic ram drive and hydraulic drive of table feeds.

Cutting speed is uniform and cutting pressure constant from the beginning of every cut to its end.

The rotary table is mounted on a carriage which travels horizontally in longitudinal directions on a saddle which in turn moves transversely on the

ways of the base. Like carriage and saddle, table has hand adjustment and power rapid traverse in either direction.

The ram may be tilted forward any amount up to 10°.

A pendant gives the operator complete and continuous control of all machine movements from any working position.

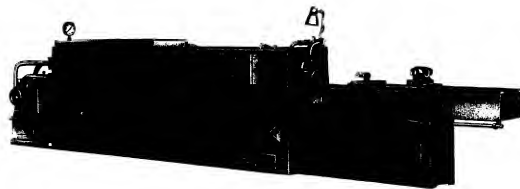
SPECIFICATIONS

Capacity		Speeds and Feeds	
Stroke of ram, mm:		Range of ram speeds (hydraulic), m/min.	5—23
Minimum	125	Range of table feeds per one stroke of ram (infinite), mm:	
Maximum	580	Longitudinal	0—1.5
Maximum height of work admitted, mm	700	Cross	0—3
Maximum diameter of work admitted, mm	900	Range of rotary table feeds per one stroke of ram	1—1 16'
Distance, tool post seat to column, mm	1000		
Distance, top of table to ram ways, mm	750	Drive	
Maximum cutting pressure, kg	2000	A.C. motors:	
		Main drive:	
		Power, kW	10
		Speed, r.p.m.	1000
		Rapid traverse:	
		Power, kW	1.7
		Speed, r.p.m.	1000
		Space Occupied	
		Floor space, mm	3530 × 2100
		Height of machine, mm	3450
		Weight	
		Net weight, kg	approx. 7800

СТАНКОИМПОРТ

HORIZONTAL BROACHING MACHINE

MODEL 7 A 510



The 7 A 510 Horizontal Hydraulic Broaching Machine is designed for internal broaching of various shapes, where accuracy, fine finish and high production are required. It is particularly adapted for use in mass and large lot production.

The machine can be operated on either a semi-automatic or automatic cycle.

The automatic cycle of the machine includes the following automatic movements (after the work has been loaded and the starting lever pressed): approach of broaching tool and clamping it in puller, cutting stroke, fall of work into tray, return stroke, unclamping of broach and withdrawing it to starting position.

The semi-automatic cycle differs from the automatic one in that the machine stops after finishing the cutting stroke: the work is then unloaded and the return stroke started by pressing the lever.

The cutting and return strokes as well as the approach and withdrawal movements of the broach are effected by hydraulic means.

One lever controls the machine movements.

The length of stroke can be varied by means of adjustable dogs.

A separate pump is provided for the cooling system and ample coolant is supplied at both sides of the work.

The machine is equipped with three motors.

СТАНКОИМПОРТ

SPECIFICATIONS

Capacity		Main drive pump:	
Normal pulling capacity, tons	10	Power, kW	14
Maximum pulling capacity, tons	11	Speed, r.p.m.	1000
Maximum stroke, mm	1250	Pump for approach and withdrawal of broach:	
Diameter of hole in face plate, mm	100	Power, kW	2.8
		Speed, r.p.m.	1500
Speeds		Coolant pump:	
Range of cutting speeds (infinitely variable), m/min.	1.5—13	Power, kW	0.125
Speed of return stroke, m/min.	25	Speed, r.p.m.	3000
Speed of approach and withdrawal movements of broach, m/min.	16	Space Occupied	
Drive		Floor space, mm	6080 x 880
220/380 volt, 3 phase, 50 cycle A.C. motors:		Height of machine, mm	1200
		Weight	
		Net weight, kg	approx. 4000

HORIZONTAL BROACHING MACHINE

MODEL 7 A 520



The 7 A 520 Horizontal Hydraulic Broaching Machine is designed for internal broaching of various shapes, where accuracy, fine finish and high production are required. It is particularly adapted for use in mass and large lot production.

The machine can be operated on either a semi-automatic or automatic cycle.

The automatic cycle of the machine includes the following automatic movements (after the work has been loaded and the starting lever pressed): approach of broaching tool and clamping it in puller, cutting stroke, fall of work into tray, return stroke, unclamping of broach and withdrawing it to starting position.

The semi-automatic cycle differs from the automatic one in that the machine stops after finishing the cutting stroke; the work is then unloaded and the return stroke started by pressing the lever.

The cutting and return strokes as well as the approach and withdrawal movements of the broach are effected by hydraulic means.

One lever controls the machine movements.

The length of stroke can be varied by means of adjustable dogs.

A separate pump is provided for the cooling system and ample coolant is supplied at both sides of the work.

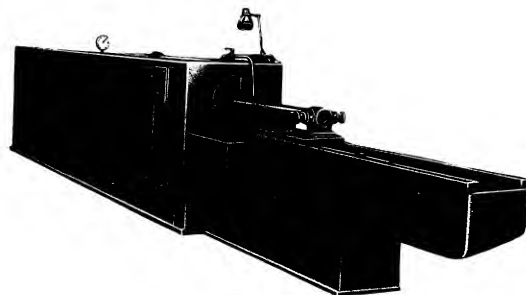
The machine is equipped with three motors.

SPECIFICATIONS

Capacity		Main drive pump:	
Normal pulling capacity, tons	20	Power, kW	20
Maximum pulling capacity, tons	26	Speed, r.p.m.	1000
Maximum stroke, mm	1600	Pump for approach and withdrawal of broach:	
Diameter of hole in face plate, mm	130	Power, kW	2.8
		Speed, r.p.m.	1500
Speeds		Coolant pump:	
Range of cutting speeds (in- finitely variable), m/min.	1.5—11	Power, kW	0.125
Speed of return stroke, m/min.	25	Speed, r.p.m.	3000
Speed of approach and with- drawal movements of broach, m/min.	16	Space Occupied	
Drive		Floor space, mm	6700 × 1870
220/380 volt, 3 phase, 50 cycle A.C. motors:		Height of machine, mm	1280
		Weight	
		Net weight, kg	approx. 6000

HORIZONTAL BROACHING MACHINE

MODEL 7540



The 7540 Broaching Machine is designed for internal broaching of various sizes and shapes in large work pieces, where accuracy, fine finish and high production are required.

The operational cycle of the machine is semi-automatic, with automatic approach and withdrawal of the broach.

Working speeds and rapid power withdrawal of slide is effected hydraulically.

The machine has an infinite range of cutting speeds. The cutting speeds may be varied without affecting the return speed.

An automatic stop is provided for controlling the length of the stroke. The length of the stroke can be varied by means of this stop or started in any position, either on cutting or return stroke, by the hand lever.

СТАВКОИМПОРТ

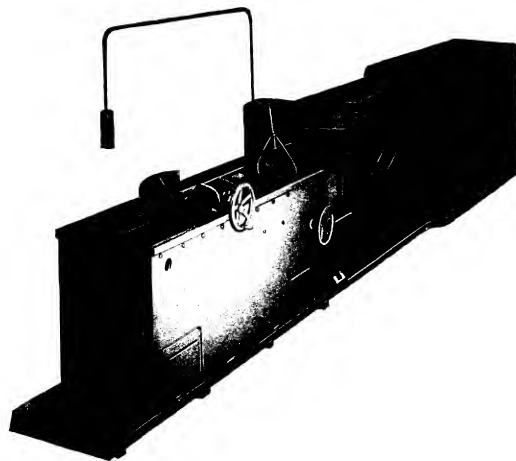
SPECIFICATIONS

Capacity		Drive	
Normal pulling capacity, ton	40	Power of hydraulic pump motor, kW	40
Maximum pulling capacity, ton	55	Hydraulic pump delivery, liters per min	400
Maximum stroke of slide, mm	2000		
Size of face plate, mm	750 X 750		
Hole diameter in face plate, mm	280 A		
Speeds		Space Occupied	
Maximum cutting speed, m/min	6.8	Floor space, mm	8350 X 2025
Maximum return speed, m/min	20	Height of machine, mm	1350
Weight			
Power approach and withdrawal of broach, m/min	12	Net weight, kg	approx. 10500

СТАНКОИМПОРТ

HORIZONTAL BROACHING MACHINE

MODEL 7551



The 7551 Horizontal Hydraulic Broaching Machine is designed for internal broaching of various shapes in large work pieces, where accuracy, fine finish and high production are required.

The machine is hydraulically driven.

Coolant is supplied at beginning and end of broach cutting action, and also to facilitate the disposal of chips from the broach.

Offset of broach axis relative to face plate axis is obtained by the slide tool which has vertical adjustment.

At the end of the forward and return strokes, the slide is automatically stopped by adjustable stops.

СТАНКОИМПОРТ

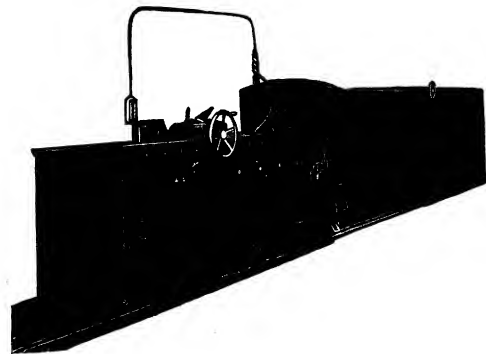
The machine is provided with an overload safety device.
The machine has steady rests for supporting both broach and work piece;
it has a traversable tray.

SPECIFICATIONS

Capacity		Return speed, m/min.:	
Maximum pulling capacity, ton	70	Minimum	0.3
Maximum diameter of broach, mm	300	Maximum	23
Hole diameter in face plate, mm	350	Drive	
Maximum longitudinal travel, mm	1900	Hydraulic pump delivery, liters per min.	400
Maximum diameter of work piece, mm:		Maximum pressure, atm	100
Without tray	1600	220/380 volt, 3 phase, 50 cycle electric motors:	
With tray	480	Main drive:	
Maximum length of work piece, mm:		Power, kW	55
Without tray	800	Speed, r. p. m.	1000
With tray	250	Coolant pump:	
		Power, kW	1.0
		Speed, r. p. m.	1500
		Space Occupied	
		Floor space, mm	9205 × 2100
		Height of machine, mm	2215
		Weight	
		Net weight, kg	approx. 16000
		Speeds	
		Cutting speeds, m/min.:	
		Minimum	0.3
		Maximum	3.7

HORIZONTAL BROACHING MACHINE

MODEL 7552



The 7552 Horizontal Hydraulic Broaching Machine is designed for internal broaching of various shapes in large pieces, where accuracy, fine finish and high production are required.

The machine is hydraulically driven.

Coolant is supplied at beginning and end of broach cutting action, and serves also to facilitate the disposal of chips from the broach.

Offset of broach axis relative to face plate axis is obtained by the slide tool which has vertical adjustment.

At the end of the forward and return strokes, the slide is automatically stopped by adjustable stops.

The machine is provided with an overload safety device.

The machine has steady rests for supporting both broach and work piece; it has a traversable tray.

SPECIFICATIONS

Capacity		Drive	
Maximum pulling capacity, ton	100	Hydraulic pump delivery,	400
Maximum diameter of broach, mm	500	liters per min.	100
Hole diameter in face plate, mm	550	Maximum pressure, atm	100
Maximum longitudinal travel, mm	2000	220/380 volt, 3 phase, 50 cycle electric motors:	
Maximum diameter of work piece, mm:		Main drive:	
Without tray	2600	Power, kW	55
With tray	600	Speed, r.m.p.	1000
Maximum length of work piece, mm:		Coolant pump:	
Without tray	1000	Power, kW	1.0
With tray	250	Speed, r.p.m.	1500
Cutting speeds, m/min.:			
Minimum	0.3		
Maximum	3.7		
Return speed, m/min.:			
Minimum	0.3		
Maximum	23		

Space Occupied

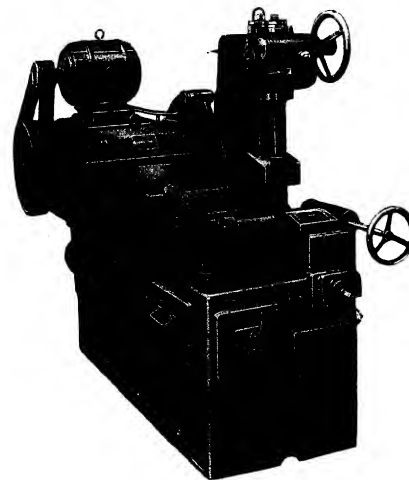
Floor space, mm	10315 x 2037
Height of machine, mm	2415

Weight

Net weight, kg	approx. 19000
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COLD SAWING MACHINE

MODEL 8 B 66



The 8 B 66 Cold Sawing Machine is designed for cutting off round and square stocks and other structural shapes.

This machine is exceptionally rigid and strong, its bed being of extra heavy box section construction, proportionally designed to withstand all stresses during the operation. The saw carriage houses the whole of the gear drive to the saw spindle. All gears of the saw carriage are made of special heat-treated steel.

All moving shafts are mounted in ball bearings, and a built in pump affords forced feed lubrication to the drive.

The saw spindle has six different speeds, so that correct saw speeds may be obtained to suit the material being cut. The working feed and return stroke of the saw carriage, the lifting mechanism, and the vertical and horizontal vises are operated through a hydraulic system.

A special form of control valves ensures perfectly regular feed; vise control valves are interlocked in such a manner that the saw blade cannot feed forward until the work has been securely clamped.

An outer bogey can be provided to support the ends of long bars.

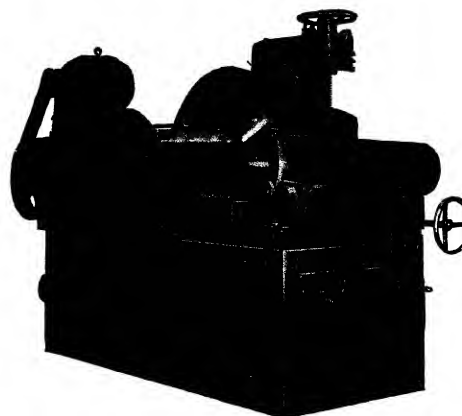
SPECIFICATIONS

Capacity	Range of feeds (hydraulic), mm/min.	25—500
Cutting capacity for rounds, mm	240	
Cutting capacity for squares, mm	220	
Cutting capacity for I-beams No. 50	220/380 volt, 3 phase, 50 cycle	
Cutting capacity for channels No. 40	A. C. motor: Power, kW Speed, r.p.m.	7 1500
Saw Blade	Space Occupied	
Diameter of saw blade, mm .	710	
	Floor space, mm	2465 × 1290
	Height of machine, mm . . .	1850
Speeds and Feeds	Weight	
Number of saw spindle speeds	6	
Range of spindle speeds, r.p.m.	3.3—25.5	Net weight, kg approx. 3800

СТАНКОИМПОРТ

COLD SAWING MACHINE

MODEL 8 A 67



The 8 A 67 Cold Sawing Machine has been designed for cutting off round and square stocks and other structural shapes.

This machine is exceptionally rigid and strong, its bed being of extra heavy box section construction, proportionally designed to withstand all stresses during the operation.

The saw spindle has six different speeds, so that correct saw speeds may be obtained to suit the material being cut.

The working feed and return stroke of the saw carriage, the vertical and horizontal vises are operated through a hydraulic system.

An outer bogey can be provided to support the ends of long bars.

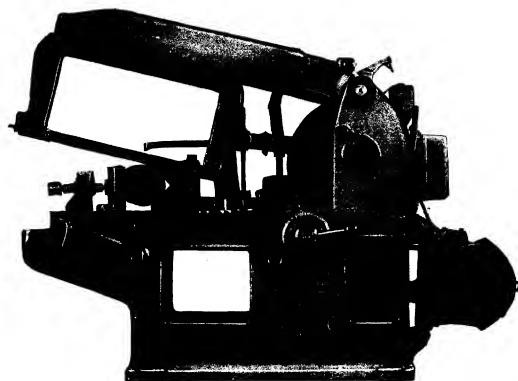
СТАНКОИМПОРТ

SPECIFICATIONS

Capacity		Drive	
Cutting capacity for rounds, mm	350	220/380 volt, 3 phase, 50 cycle	
Cutting capacity for squares, mm	300	A. C. motors:	
Cutting capacity for I-beams	No. 60	Saw spindle drive:	
Cutting capacity for channels	No. 40	Power, kW	10
		Speed, r. p. m.	1000
		Hydraulic pump:	
		Power, kW	2.8
		Speed, r. p. m.	1500
Saw Blade		Space Occupied	
Diameter of saw blade, mm	1010	Floor space, mm	2970 x 1610
		Height of machine, mm	2040
Speeds and Feeds		Weight	
Number of saw spindle speeds	6		
Range of saw spindle speeds, r. p. m.	2—20		
Range of feeds (hydraulic), mm/min.	12—450	Net weight, kg	approx. 7000

HACK SAWING MACHINE

MODEL 872 A



The 872 A Hydraulic Hack Sawing Machine is designed for cutting off bars, tubings, structural shapes with hack-saw blades.

The cutting can be carried out in the plane normal to the work center line and at any angle up to 45°.

The number of saw frame double strokes is changed by means of shifting belts to various steps of the pulleys.

The machine is equipped with a hydraulic device securing lifting the saw frame at return stroke as well as lowering and feeding during the cutting process.

On the completion of the cutting operation the pressure on the saw is automatically eased off, preventing breakage of the saw blade and the saw frame is lifted to the starting position.

The feeds are infinitely variable and are set up depending on material sawn. The machine is equipped with overload protecting devices.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

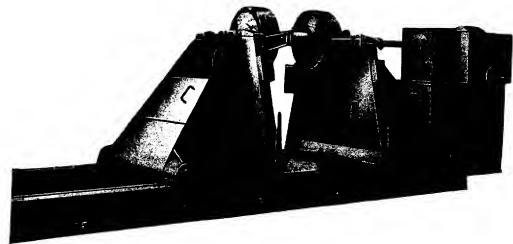
SPECIFICATIONS

Capacity		Drive	
Maximum diameter (or side of quadrant) of material to be cut, mm	250	220/380 volt, 3 phase, 50 cycle A.C. motor:	
Maximum width of material to be cut at angle of 45°, mm	120	Power, kW	1.7
		Speed, r. p. m.	1500
Saw Frame		Space Occupied	
Number of saw frame double strokes per minute	85 and 110	Floor space, mm	1470 x 825
Length of saw frame stroke, mm	150	Height of machine, mm	855
Length of saw blade, mm	500	Weight	
Width of cut, mm	2.5	Net weight, kg	approx. 630

СТАНКОИМПОРТ

DYNAMIC BALANCING MACHINE

MODEL 9734



The 9734 Balancing Machine is designed for quickly and accurately measuring and locating dynamic unbalance of rotating machine parts, such as: steam turbine rotors, high speed electrical machine rotors and others.

The left and the right stands of the machine are mounted on a bed with longitudinal ways.

The bed is constructed of three parts: each a rigid box-shaped iron casting.

The housings of the stands are of steel welded design.

The spindle of the machine is mounted in precision ball bearings.

The machine is controlled from a central control desk, which is mounted on the spindle head.

The machine is also provided with push-button controls, located on the stands.

SPECIFICATIONS

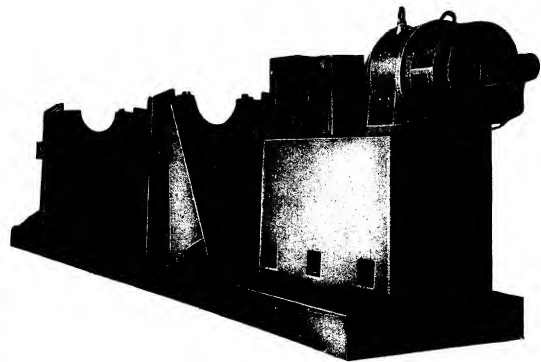
Capacity		Maximum diameter of work to be balanced, mm	
Distance, axis of centers to bed, mm	1200	Maximum diameter of work journal, mm	2500
Distance between centers of supports, mm:		Weight of work to be balanced, kg:	300
Minimum	300	Minimum	300
Maximum	4000	Maximum	3200

СТАНКОИМПОРТ

Speeds	
Maximum work speed (infinitely variable), r. p. m.	560
Drive	
Main drive D. C. motor:	
Power, kW	15
Speed, r. p. m.	1560
(for set-up purposes, provision	
is made to reduce motor speed to 20—40 r. p. m.)	
Space Occupied	
Floor space, mm	7560 × 1800
Height of machine, mm	1820
Weight	
Net weight (without electric motor), kg	approx. 8800

DYNAMIC BALANCING MACHINE

MODEL 9736 A



The 9736 A Balancing Machine is designed for quickly and accurately measuring and locating dynamic unbalance of rotating machine parts, such as: high speed electrical machine rotors, steam turbine rotors, etc.

The left and the right stands of the machine are mounted on a bed with longitudinal ways.

The bed is constructed of three parts, each a rigid box shaped iron casting. The housings of the stands are of steel welded design.

The spindle of the machine is mounted in precision ball bearings.

The machine is controlled from a central control desk, which is mounted on the spindle head. The machine is also provided with push-button controls, located on the stands.

СТАНКОИМПОРТ

SPECIFICATIONS

Capacity		Drive	
Distance, axis of centers to bed, mm	1560	Main drive D. C. motor:	
Distance between centers of supports, mm:		Power, kW	133
Minimum	350	Speed, r. p. m.	1350
Maximum	6500	(for set-up purposes provision is made to reduce motor speed to 20—40 r. p. m.)	
Maximum diameter of work to be balanced, mm	3200		
Maximum diameter of work journal, mm	500		
Weight of work to be balanced, kg:			
Minimum	1000		
Maximum	16000		
Speeds		Weight	
Maximum work speed (infinitely variable), r. p. m.	450	Net weight (without motors), kg	approx. 11500

СТАНКОИМПОРТ

Vsesojuznoje Exportno-Importnoje Objedinenije

"STANKOIMPORT"

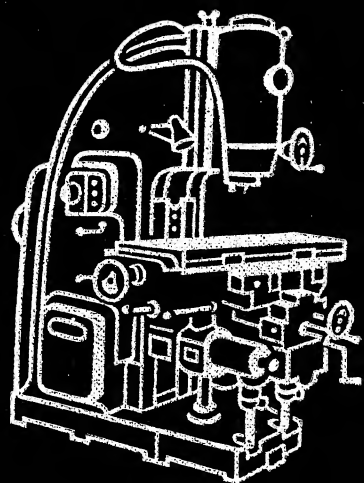
EXPORTS AND IMPORTS:

Machine Tools
 Woodworking Machinery
 Metal Working Machinery (Presses, Hammers, Shears, Cold Forming Machines, Punching Machines)
 Rolling Mills (imports)
 Measuring Instruments and Apparatus (for metal industry)
 Testing Machines and Instruments (for metals)
 Optical Instruments and Equipment
 Portable Electric and Pneumatic Tools (for metal and wood-working)
 Metal and Wood Cutting Tools
 Mechanic's Tools and Chucks
 Sintered Carbide and Hard-Alloy Products
 Abrasive Products
 Ball and Roller Bearings
 Microscopes of all types
 Motion-Picture Equipment and Accessories
 Geodetic Instruments and Equipment
 Photographic Cameras
 Binoculars
 Magnifiers
 Lenses
 Crude Optical Glass Blocks and Blanks

Design and specifications of the machine tools illustrated herein are subject to change without notice.

Vsesojuznoje

Order No 150



MILLING MACHINES

STANKOIMPORT

VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE
STANKOIMPORT

DRUM TYPE MILLING MACHINES
VERTICAL ROTARY CONTINUOUS MILLING MACHINES
VERTICAL MILLING MACHINES
PROFILE MILLING MACHINES
PLANER TYPE MILLING MACHINES
UNIVERSAL MILLING MACHINES
HORIZONTAL MILLING MACHINES
KEYWAY MILLING MACHINES



U S S R
M O S C O W

This catalogue contains short specifications of the most common types of machine tools exported by the Vsesojuznoje Exportno-Importnoje Objedinenije "Stankoimport".

Detailed pamphlets sent on request.

All inquiries and correspondence to be forwarded to:

Vsesojuznoje Exportno-Importnoje Objedinenije
"Stankoimport"

32/34, Smolenskaja-Sennaja pl., Moscow, USSR

For cables: Stankoimport Moscow

Phone: G4-21-32

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The Machine Tools produced in the U.S.S.R. are outstanding for their high efficiency, convenience and safety in operation and long service.

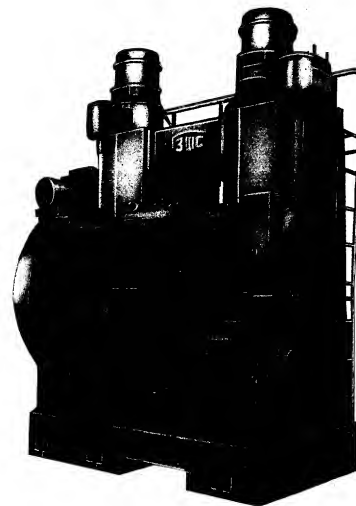
The first-class material, perfect modern design and skilful workmanship provide accuracy, high efficiency and durability of the Machine Tools.

Steady improvement of machine tool design in the U.S.S.R. aims at the increase of productivity, accuracy, reliability and dependability of machine in operation, as well as the reduction of operator's fatigue by improving and convenient placing of all operating controls and the all-increasing automatization of operation.

The Vsesojuznoje Exportno-Importnoje Objedinenije "Stankoimport" is able to offer a wide range of Machine Tools both universal and special types including Automatic Transfer Machines and Automatic Workshops.

DRUM TYPE MILLING MACHINE

MODEL 6022



The 6022 Drum Type Milling Machine is designed for milling of flat surface of cylinder heads, cases, cylinder blocks and other similar work on mass production basis.

Two upper spindle heads are used for two-side rough milling and two lower heads — for finish milling.

The right-hand spindle heads as well as the left-hand heads are powered by individual electric motors mounted on the top of the housings. Spindle speeds are changed by means of change gears.

СТАНКОИМПОРТ

The drum, carrying the work pieces, is driven by a separate electric motor through a feed box.

Change of feed (speed of drum rotation) is accomplished by means of change gears. Machine control is accomplished by means of push-button stations, located on front and rear sides of the machine.

The machine is equipped with four electric motors.

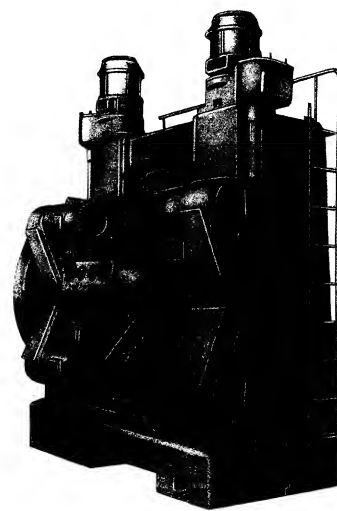
SPECIFICATIONS

Capacity	Range of spindle speeds, r. p. m.:	
Distance between housings, mm	900	1st range 2nd range For rough milling 23—75 37—118 For finish milling 37—118 60—190
Distance between spindle faces, mm:	580	Number of drum feeds 6
Minimum	790	Time of one complete turn of drum, min.:
Maximum	1500	Minimum 12.7 Maximum 41
Distance, center of drum spindle to floor, mm	2300	
Maximum outside diameter of work piece contour that can be milled, mm		
Drive		
220/380 volt, 3 phase, 50 cycle		
A. C. motors:		
Spindle heads (2 motors):		
Power, kW		10-20
Speed, r. p. m.		1500
Feed drive:		
Power, kW		2.8
Speed, r. p. m.		1000
Lubricating pump:		
Power, kW		0.6
Speed, r. p. m.		1000
Spindle Heads		
Number of spindle heads	4	
Spindle nose acc. to GOST 836-47		
Diameter of spindle hole, mm	20	
Drum		
Drum diameter, mm	1000	
Drum length, mm	650	
Space Occupied		
Floor space, mm		3060 X 1950
Height of machine, mm		3750
Weight		
Net weight (without attach- ments), kg approx.	25000	
Speeds and Feeds		
Number of each spindle speeds	6	

СТАНКОИМПОРТ

DRUM TYPE MILLING MACHINE

MODEL 6023



The 6023 Drum Type Milling Machine is designed for milling of flat surfaces of cylinder heads, cases, cylinder blocks and other similar work on mass production basis.

Two upper spindle heads are used for two-side rough milling and two lower heads — for finish milling.

СТАНКОИМПОРТ

The right-hand spindle heads as well as the left-hand heads are powered by individual electric motors mounted on the top of the housings.

Spindle speeds are changed by means of change gears.

The drum, carrying the work pieces, is driven by a separate electric motor through a feed box.

Change of feed (speed of drum rotation) is accomplished by means of change gears. Machine control is accomplished by means of push-button stations, located on front and rear sides of the machine.

The machine is equipped with four electric motors.

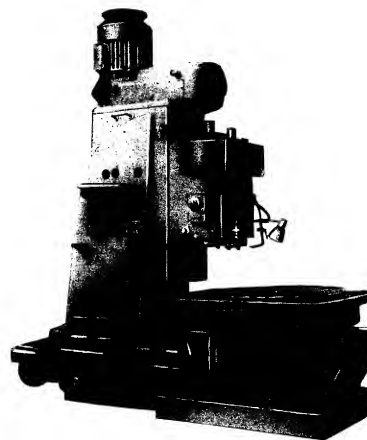
SPECIFICATIONS

Capacity		Range of spindle speeds, r. p. m.:	
Distance between housings, mm	1150		1-st range 2-nd range
Distance between spindle faces, mm:		For rough milling	23—75 37—118
Minimum	830	For finish milling	37—118 60—190
Maximum	1040	Number of drum feed	6
Distance, center of drum spindle to floor, mm	1500	Time of one complete turn of drum, min.:	
Maximum outside diameter of work piece contour that can be milled, mm	2300	Minimum	12.7
		Maximum	41
Drive			
220/380 volt, 3 phase, 50 cycle			
A. C. motors:			
Spindle heads (2 motors):			
Number of spindle heads	4	Power, kW	10—20
Spindle nose acc. to GOST 836-47		Speed, r. p. m.	1500
Diameter of spindle hole	29	Feed drive:	
		Power, kW	2.8
		Speed, r. p. m.	1000
		Lubricating pump:	
		Power, kW	0.6
		Speed, r. p. m.	1000
Drum			
Drum diameter, mm	1000	Space Occupied	
Drum length, mm	900	Floor space, mm	3310 × 1950
		Height of machine, mm	3750
		Net weight (without attach- ments), kg approx.	26000
Speeds and Feeds			
Number of each spindle speeds	6		

СТАНКОИМПОРТ

VERTICAL ROTARY CONTINUOUS MILLING MACHINE

MODEL 621



The 621 Two Spindle Vertical Rotary Continuous Milling Machine is designed for fast production on steel and cast-iron parts with flat surfaces to be milled with one or two cuts, using face milling cutters, and is adapted for lot and mass production.

By changing several gears the machine may be set up for milling of light metal parts.

The two independent spindle head makes it possible to perform rough and finish milling at one setting of the work.

СТАНКОИМПОРТ

The table of the machine is rotated on the ways in the cross slide.
The table is driven through a feed box, two pairs of gears and worm and wheel.

Spindle speeds and table circular feeds are changed by means of pick-off gears.

Machine control is accomplished by means of push-buttons. Push-button stations are conveniently located on both sides of the machine column.

SPECIFICATIONS

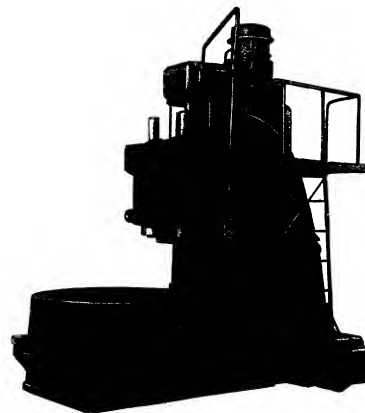
Capacity		Speeds and Feeds	
Distance from center line of spindle to column vertical ways, mm	300	Number of speeds of each spindle	8
Distance from center line of table to column vertical ways, mm:		Range of spindle speeds, r. p. m.:	
Minimum	500	Spindle for rough milling	37.5—190
Maximum	800	Spindle for finish milling	60—300
Distance from spindle face to top of table, mm:		Number of table circular feeds	12
Minimum	0	Range of table circular feeds (referred to diameter of)	
Maximum	450	1000 mm), mm/min.	75—950
Table		Drive	
Table diameter, mm	1000	220/380 volt, 3 phase, 50 cycle A. C. motors:	
Maximum cross travel of table, mm	300	Main drive:	
		Power, kW	7—10
		Speed, r. p. m.	1500
		Table circular feed drive:	
		Power, kW	2.8
		Speed, r. p. m.	1500
Spindle Head		Space Occupied	
Number of spindles	2	Floor space, mm	2610 × 1530
Maximum vertical travel of spindle head, mm	350	Height of machine, mm	3100
Maximum travel of spindle quill, mm	100		
Spindle nose acc. to GOST 835-47		Weight	
Center distance between spindles, mm	330	Net weight, kg approx. 7900	

СТАНКОИМПОРТ



VERTICAL ROTARY CONTINUOUS MILLING MACHINE

MODEL 623



The 623 Two Spindle Vertical Rotary Continuous Milling Machine is designed for fast production on steel and cast-iron parts with flat surfaces to be milled with one or two cuts, using face milling cutters, and is especially adapted for mass production.

By changing several gears the machine may be set up for milling of light metal parts.

The two independent spindle head makes it possible to perform rough and finish milling at one setting of the work.

The machine is equipped with two electric motors, controlled from the main push-button station.

СТАНКОИМПОРТ

Spindle speeds and table circular feeds are changed by means of pick-off gears.

Horizontal adjustment to the table, vertical adjustment to the spindle head and axial adjustment of each spindle are accomplished by hand.

SPECIFICATIONS

Capacity		Speeds and Feeds	
Distance from center line of spindle to column vertical ways, mm	360	Number of speeds of each spindle	8
Distance from center line of table to column ways, mm: Minimum	750	Range of spindle speeds, r. p. m.: Spindle for rough mil-ling	30—150
Maximum	1100	Spindle for finish mil-ling	47.5—235
Distance from spindle face to top of table, mm: Minimum	100	Number of table circular feeds	12
Maximum	600	Range of table circular feeds (referred to diameter of 1000 mm), mm/min.	60—750
Table		Drive	
Table diameter, mm	1500	220/380 volt, 3 phase, 50 cycle A. C. motors:	
Maximum cross travel of table, mm	350	Main drive:	
		Power, kW	14—20
		Speed, r. p. m.	1500
		Table circular feed drive:	
		Power, kW	2.8
		Speed, r. p. m.	1500
Spindle Head		Space Occupied	
Number of spindles	2	Floor space, mm	3210 × 2090
Maximum vertical travel of spindle head (by hand), mm	350	Height of machine, mm	3185
Maximum travel of spindle quill, mm	150		
Spindle nose acc. to GOST 836-47			
Center distance between spindles, mm	470	Weight	
		Net weight, kg	approx. 15000

СТАНКОИМПОРТ

VERTICAL MILLING MACHINE

MODEL 6H11



The 6H11 Vertical Milling Machine has been designed for miscellaneous milling operations on general manufacturing work, using various types of cutters such as end mills, face milling cutters, etc.

The machine has a height table with a fixed spindle head, all adjustments being made through the knee.

СТАНКОИМПОРТ

The machine is supplied with a climb cutting device which eliminates backlash in the table feed screw; thus, either climb or conventional milling operations can be performed.

Power rapid traverse in three directions for the table is provided.

The machine has dial selectors for quick change of spindle speeds and table feeds.

A heavy flywheel mounted on the spindle insures a smooth flow of power to the spindle.

The speed and feed ranges offer great efficiency in milling operations on parts made of various grades of steel, cast iron, aluminium, bronze, using conventional high speed steel or sintered carbide cutters.

Two separate motors are used for driving the spindle and feeding the table.

SPECIFICATIONS

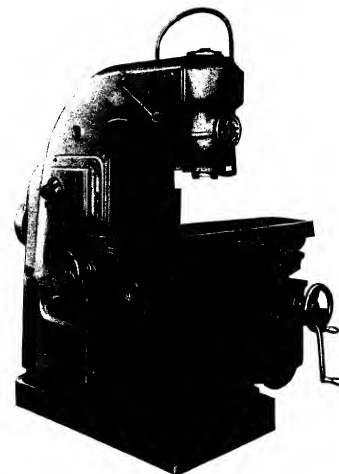
Capacity			
Working surface of table, mm:	1000×250	Longitudinal	35—980
Distance, end of spindle to top of table, mm:		Cross	25—765
Minimum	30	Vertical	12—380
Maximum	380	Table rapid traverse, mm:	
Distance, center of spindle to face of column, mm	270	Longitudinal	2900
Maximum table traverse (by power or manually), mm:		Cross	2200
Longitudinal	580	Vertical	1100
Cross	200	Drive	
Vertical	350	220/380 volt, 3 phase, 50 cycle	
Spindle nose	No. 2, acc. to GOST 836-47	A.C. motors:	
		Main drive:	
		Power, kW	4.5
		Speed, r. p. m.	1500
		Feed drive:	
		Power, kW	1.7
		Speed, r. p. m.	1500
Speeds and Feeds		Space Occupied	
Number of spindle speeds	16	Floor space, mm	2060 × 1530
Range of spindle speeds, r. p. m.	65—1800	Height of machine, mm	2300
Number of table feeds (longitudinal, cross and vertical)	16	Weight	
Range of table feeds, mm/min.:		Net weight, kg approx. 2100	

СТАНКОИМПОРТ



VERTICAL MILLING MACHINE

MODEL 6H12



The 6H12 Vertical Milling Machine has been designed for miscellaneous milling operations using various types of cutters such as end mills, face milling cutters, etc.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools.

Rapid traverse in three directions is provided for the table. The machine can also be operated as an automatic cycle milling machine with continuous

СТАНКОИМПОРТ

or intermittent cycle. With these features the machine is adaptable to both milling operations on general manufacturing and mass production work.

Dial selectors are provided for quick change of spindle speeds and table feeds.

Two separate motors are used for driving the spindle and feeding the table.

Lever and push-button control located at the front of the machine is duplicated at the left-hand side for convenience in complete hand control.

SPECIFICATIONS

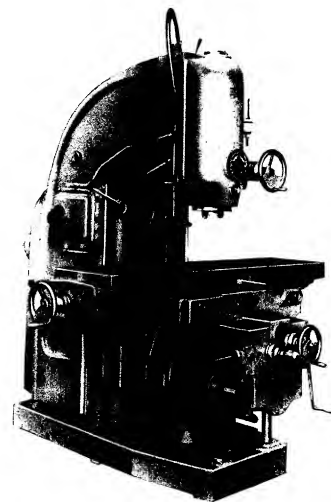
Capacity		Range of vertical feeds, mm/min.		8—390
Working surface of table, mm	1250×320	Table rapid traverse, mm/min.:		
Distance, spindle face to top of table, mm:		Longitudinal and cross	2300	
Minimum	30	Vertical	770	
Maximum	400	Drive		
Spindle nose No. 3, acc. to GOST 836.47		220/380 volts, 3 phase, 50 cycle		
Maximum table traverse (power or manual), mm:		A. C. motors:		
Longitudinal	700	Main drive:		
Cross	260	Power, kW	7	
Vertical	370	Speed, r. p. m.	1500	
		Feed drive:		
		Power, kW	1.7	
		Speed, r. p. m.	1500	
Speeds and Feeds		Space Occupied		
Number of spindle speeds	18	Floor space, mm	2100×1740	
Range of spindle speeds, r. p. m.	30—1500	Height of machine, mm	1875	
Number of table feeds (longitudinal, cross and vertical)	18	Weight		
Range of longitudinal and cross feeds, mm/min.	23.5—1180	Net weight, kg	approx. 2800	

СТАНКОИМПОРТ



VERTICAL MILLING MACHINE

MODEL 6H13



The 6H13 Vertical Milling Machine has been designed for miscellaneous milling operations using various types of cutters such as end mills, face milling cutters, etc.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools.

Vertical movement is provided to the spindle head and rapid traverse in three directions — for the table. The machine can also be operated as an

СТАНКОИМПОРТ

automatic cycle milling machine with continuous or intermittent cycle. With these features the machine is adaptable to both milling operations on general manufacturing and mass production work.

Dial selectors are provided for quick change of spindle speeds and table feeds.

Two separate motors are used for driving the spindle and feeding the table.

Lever and push-button control located at the front of the machine is duplicated at the left-hand side for convenience in complete hand control.

SPECIFICATIONS

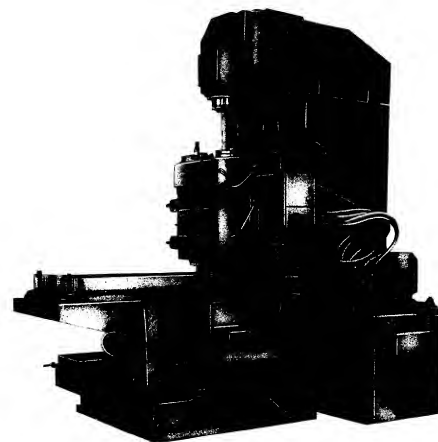
Capacity		Range of vertical feeds,	
Working surface of table, mm	1600×400	mm/min.	8—390
Distance, spindle face to top of table, mm:		Table rapid traverse, mm/min.:	2300
Minimum	30	Longitudinal and cross	770
Maximum	450	Vertical	
Spindle nose No. 3, acc. to GOST 836-47		Drive	
Maximum table traverse (power or manual), mm:		220/380 volt, 3 phase, 50 cycle A.C. motors:	
Longitudinal	900	Main drive:	
Cross	320	Power, kW	10
Vertical	420	Speed, r.p.m.	1750
		Feed drive:	
		Power, kW	2.8
		Speed, r.p.m.	1750
Speeds and Feeds		Space Occupied	
Number of spindle speeds	18	Floor space, mm	2370 × 2140
Range of spindle speeds, r.p.m.	30—1500	Height of machine, mm	2245
Number of table feeds (longitudinal, cross and vertical)	18	Weight	
Range of longitudinal and cross feeds, mm/min.	23.5—1180	Net weight, kg	approx. 4300

СТАНКОИМПОРТ



VERTICAL TWO SPINDLE HYDRAULIC PROFILE MILLING MACHINE

MODEL 1C70



The 1C70 Vertical Two Spindle Hydraulic Profile Milling Machine is designed for two-dimensional form milling. Milling of the form contour is done, depending on the shape of the work piece, with the end mills or cylindrical cutters, using the flat templates and semi-automatic cycle (with the hand control).

Copying of the contour is accomplished by means of the simultaneous movement of the upper and lower tables of the machine in two directions.

Longitudinal and cross movements of the table is accomplished by means of hydraulic cylinders.

СТАНКОИМПОРТ

Rotation to the two spindles of the milling head is taken from a spline shaft of the gear box. The spindles are mounted in quills; the spindle quills can be adjusted along their axes for the vertical setting of the cutters.

The hydraulic copying device is mounted on the right side of the milling head and the electric control stops are located on its left side.

Vertical movement of the milling head and its clamping to the column ways are accomplished by means of hydraulic cylinders.

12 spindle speeds are obtained through the speed gear box. When it is necessary, the range of the spindle speeds may be changed by means of the pick-off gears.

The templates are mounted on the template table located at the left side of the upper table.

SPECIFICATIONS

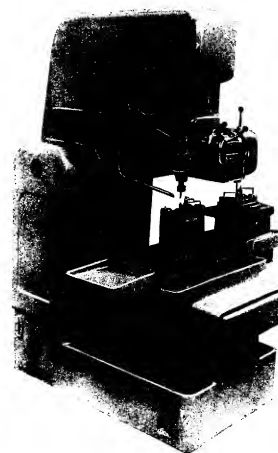
Capacity		Maximum longitudinal travel of upper table, mm	400
Number of spindles	2	Height from floor to top of upper table, mm	900
Center distance between spindles, mm	500	Speeds and Feeds	
Maximum overhang of cutter from the spindle face, mm	150	Number of spindle speeds	12
Maximum dimensions of work piece machined, mm:		Range of spindle speeds, r.p.m.	75—950
Length	350	Feeds along the contour, mm/min.:	
Width	350	Minimum	30
Height	150	Maximum	400
Maximum depth of milling, mm	15	Drive	
Cutters		Number of electric motors	4
Diameter of cutter, mm:		Total power of all motors, kW	17.2
Minimum	20	Main drive motor:	
Maximum	100	Power, kW	14
Milling Head		Speed, r.p.m.	1500
Maximum travel of milling head on ways, mm	250	Space Occupied	
Adjustment for length of travel, mm	150	Floor space, mm	2400 × 3435
Tables		Height of machine, mm	3000
Working surface of table, mm	1330 × 600	Weight	
Maximum cross travel of lower table, mm	400	Net weight, kg	approx. 18000

СТАНКОИМПОРТ



HYDRAULIC PROFILE MILLING MACHINE

MODEL ОФ-8



The ОФ-8 Profile Milling Machine is designed for automatic two-dimensional profile milling of the complicated contours from templates or models. The work piece is clamped on the working table itself or in attachment, placed on the table, and a model or template — on the table of the template.

Copying movements (longitudinal and cross travel of the table) are hydraulically operated and controlled by the tracing device.

Vertical setting movement is provided for the spindle head.

СТАНКОИМПОРТ

Vertical feed of the spindle head permits machining profile of blind slots and recesses. Either external or internal profiles can be milled on the machine.

SPECIFICATIONS

Capacity		Speeds and Feeds	
Distance from spindle face to top of table, mm:		Number of spindle speeds . . .	9
Minimum	190	Range of spindle speeds, r. p. m.	200—1250
Maximum	390	Range of spindle feeds, mm/min.	40—200
Distance from center line of spindle to column, mm . .	360	Range of table feeds, mm/min.	60—260
Distance between spindle and tracer centers, mm: . . .		Rapid traverse of spindle and table, m/min.	1.2
Longitudinal direction . .	625		
Cross direction	80		
Maximum dimensions of contour machined, mm:		Drive	
Length	625	220/380 volt, 3 phase, 50 cycle	
Width	250	A. C. motors:	
		Spindle drive:	
		Power, kW	2.8
		Speed, r. p. m.	1500
		Hydraulic system:	
		Power, kW	1.7
		Speed, r. p. m.	1500
		Tracer oscillating motion:	
		Power, kW	0.125
		Speed, r. p. m.	3000
		Coolant pump:	
		Power, kW	0.125
		Speed, r. p. m.	3000
		Space Occupied	
		Floor space, mm	1445 × 1530
		Height of machine, mm . . .	2010
		Weight	
		Net weight, kg	approx. 3100

СТАНКОИМПОРТ

HYDRAULIC PROFILE MILLING MACHINE

MODEL 642K



The 642K Profile Milling Machine is designed for automatic two-dimensional profile milling of different type work pieces (connecting rods, cams, turbine blades, etc.).

Copying movements (longitudinal and cross travel of the table) are hydraulically operated and controlled by the tracing device.

Scale of copying is 1 : 1.

Either external or internal profiles can be milled on the machine. Setting of spindle head at different height allows machining of contours in different planes.

СТАНКОИМПОРТ

Vertical feed of the spindle permits milling of profile of blind slots and recesses.

SPECIFICATIONS

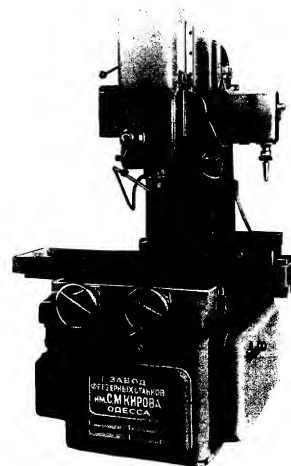
Capacity		Speeds and Feeds	
Distance from spindle face to top of table, mm:		Number of spindle speeds . . .	4
Minimum	200	Range of spindle speeds, r. p. m.	200—1600
Maximum	400	Range of spindle head vertical feeds (hydraulic), mm/min.	30—300
Distance from center of spindle to column, mm	350	Range of table feeds (hydraulic), mm/min.	60—300
Distance from rear face of table to column, mm:		Rapid traverse of spindle head and table, m/min.	1
Minimum	65		
Maximum	315		
Distance between spindle and tracer finger centers, mm	560		
Spindle Head		Drive	
Maximum vertical travel of spindle head (hydraulic or manual), mm	200	220/380 volt, 3 phase, 50 cycle A. C. motors:	
Taper hole in spindle	Morse No. 4	Spindle drive (two-speed):	
Work Table		Power, kW	2.5/2.8
Surface of table (size overall), mm	1250 × 320	Speeds, r. p. m.	1500/3000
Working surface of table, mm	800 × 320	Hydraulic system:	
Maximum travel of table (hydraulic), mm:		Power, kW	1.7
Longitudinal	400	Speed, r. p. m.	1500
Cross	250	Tracer oscillating motion:	
Template Table		Power, kW	0.125
Working surface of table, mm	320 × 250	Speed, r. p. m.	3000
Maximum travel of table (manual), mm:		Coolant pump:	
Longitudinal	60	Power, kW	0.1
Cross	40	Speed, r. p. m.	3000
		Space Occupied	
		Floor space, mm	1380 × 1460
		Height of machine, mm	2190
		Weight	
		Net weight, kg	approx. 2775

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HYDRAULIC DIE-SINKING AND PROFILE MILLING MACHINE

MODEL 642



The 642 Die-Sinking and Profile Milling Machine is designed for automatic three-dimensional profile milling of forging stamping and die-casting dies, molds for plastic materials, metal patterns, etc.

Copying movements are hydraulically operated and controlled by the tracing device.

Scale of copying is 1:1.

The tracing mechanism of the machine allows operations requiring the

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copying and duplicating of convex and concave surfaces with 87° angle of rise.

Light contact pressure of the tracer finger allows the use of wood, plastics, light metal, or other easily workable material.

SPECIFICATIONS

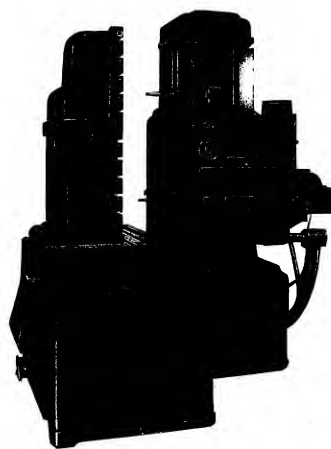
Capacity		Speeds and Feeds	
Distance from spindle face to top of table, mm:		Number of spindle speeds	6
Minimum	200	Range of spindle speeds, r.p.m.	180-2480
Maximum	400	Range of spindle head vertical feeds (hydraulic), mm/min.	30-300
Distance from spindle center to column, mm	350	Number of table feeds	30
Distance from rear face of table to column, mm:		Range of table intermittent feeds, mm	0-6
Minimum	65	Rapid traverse of spindle head and table, m/min.	1
Maximum	315		
Distance between spindle and tracer centers, mm	560		
		Drive	
Spindle Head		220/380 volt, 3 phase, 50 cycle A.C. motors:	
Maximum vertical travel of spindle head (hydraulic), mm	90	Spindle drive (three-speed motor):	
Maximum vertical travel of spindle (manual), mm	110	Power, kW	1.3 1.5 1.8
Taper hole in spindle Morse No. 4		Speed, r.p.m.	1000 1500 3000
		Hydraulic system:	
Work Table		Power, kW	1.7
Surface of table (size overall), mm	1250 x 320	Speed, r.p.m.	1500
Working surface of table, mm	800 x 320	Tracer oscillating motion:	
Maximum table travel (hydraulic or manual), mm:		Power, kW	0.125
Longitudinal	400	Speed, r.p.m.	3000
Cross	250	Coolant pump:	
		Power, kW	0.125
Template Table		Speed, r.p.m.	3000
Working surface of table, mm	320 x 250	Space Occupied	
Maximum table travel (manual), mm:		Floor space, mm	1460 x 1630
Longitudinal	60	Height of machine, mm	2100
Cross	40	Weight	
		Net weight, kg	approx. 2880

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DIE-SINKING AND PROFILE MILLING MACHINE WITH ELECTRONIC CONTROL

MODEL 6441A



The 6441A Die-Sinking and Profile Milling Machine is designed for the automatic reproduction of profiles in two dimensions or the reproduction of reliefs in three dimensions from master forms. Scale of reproduction is 1:1.

Tracer pressure necessary for reproduction is extremely light and sensitive. Therefore the master forms used can be made of wood, cement, light metals, etc.

The machine is ideally suited to the production of blanking, trimming or piercing dies and punches, extrusion dies for forging, stamping and die-casting dies, molds for plastic

materials, cams, templates, metal pattern works and odd-shape milling in general.

There are two types of operations used for three-dimensional work, either relief or impression. The first of these makes use of automatic horizontal traverse of the table, tracer controlled horizontal movement of the spindle head and intermittent vertical feed of the spindle head, the cutter being set to a given depth before the operation is started. The entire surface of the master is covered by the tracer in a series of parallel horizontal strokes.

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The second type makes use of intermittent feed of the table, tracer controlled horizontal movement of the spindle head and automatic vertical traverse of the spindle head. The entire surface of the master is covered by the tracer in a series of parallel vertical strokes.

For two-dimensional work horizontal movement of the table and vertical movement of the spindle head are used.

The tracer mechanism is the same for all types of work.

Machine control is with the use of electronic devices.

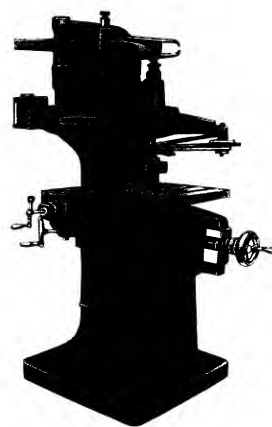
SPECIFICATIONS

Capacity		Range of intermittent feeds, mm/stroke:	
Dimensions of machined surfaces (length \times width \times height), mm	900 \times 500 \times 250	Horizontal for table	0.16 —16
		Vertical for spindle head	0.16 —16
Table		Range of steplessly variable work feed, mm/min.:	
Working surface of table, mm	600 \times 1200	Horizontal for table and vertical for spindle head	20—300
Height from floor to top of table, mm	900	Longitudinal for spindle head	50—250
Maximum horizontal traverse of table, mm	900	Rapid traverse of table, mm/min.	500
Spindle Head		Drive	
Maximum traverse of spindle head, mm:		220 360 volt, 3 phase, 50 cycle A. C. motors:	
Longitudinal	250	Spindle drive (two-speed motor):	
Vertical	500	Power, kW	2.1
Spindle		Speeds, r. p. m.	1500 3000
Maximum traverse of spindle (manual), mm	100	Amplifier drive (two motors):	
Taper hole in spindle	Morse No.4	Power, kW	0.9
Distance from center of spindle to top of table, mm		Speed, r. p. m.	3000
Minimum	100	Coolant pump:	
Maximum	600	Power, kW	0.125
Master and Work Supports		Speed, r. p. m.	3000
Maximum travel (manual), mm	± 100	D. C. motors:	
Working surface, mm:		Vertical, horizontal and longitudinal feed drive (three motors):	
Master support	900 \times 550	Power, kW	0.37
Work support	900 \times 650	Speed, r. p. m.	1000
Tracer Mechanism		Amplifier drive (two motors):	
Maximum travel (manual), mm:		Power, kW	0.5
Longitudinal	100	Speed, r. p. m.	2850
Cross	100	Space Occupied	
Vertical	150	Floor space, mm	3500 \times 2680
Speeds and Feeds		Height of machine, mm	2430
Number of spindle speeds	12	Weight	
Range of spindle speeds, r. p. m.	75—950	Net weight, kg	approx. 7500

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THREE-DIMENSIONAL PANTOGRAPH ENGRAVING MACHINE

MODEL 6461



The 6461 Pantograph Engraving Machine is designed for three-dimensional engraving work from enlarged templates or models of any shape, the reduction range being limited between 1:8 and 1:1.5. Jewellery dies, hobs, punches, different concave, convex and spherical surfaces, etc., can be produced on this machine. High speed profiling can also be accomplished. Milling works on small parts can be done with the hand movement of the table and the pantograph being clamped.

Maximum area covered by cutter point on 1:2 reduction is a circle of 150 mm in diameter.

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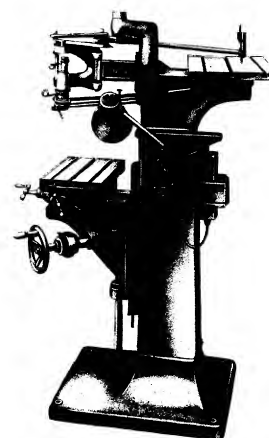
SPECIFICATIONS

Capacity		Speeds	
Reduction range	1:1.5—1:8	Number of spindle speeds . .	6
Distance from spindle nose to work table surface, mm:		Range of spindle speeds, r. p. m.	1750—9600
Minimum	0		
Maximum	250		
Cutter spindle vertical movement on 1:2 reduction, mm	20		
Work Table		Drive	
Working surface, mm	200 × 300	220/380 volt, 3 phase, 50 cycle A. C. motor:	
Maximum table traverse, mm:		Power, kW	0.6
Longitudinal	250	Speed, r. p. m.	1500
Cross	150		
Vertical	250		
Template Table		Space Occupied	
Working surface, mm	300 × 450	Floor space, mm	1250 × 1100
Maximum table traverse, mm:		Height of machine, mm . . .	1600
Longitudinal	200		
Vertical	140		
		Weight	
		Net weight, kg	approx. 560

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TWO-DIMENSIONAL PANTOGRAPH
ENGRAVING MACHINE

MODEL 6463



The 6463 Pantograph Engraving Machine is designed for flat surface engraving work from enlarged template or model clamped on a template table. Engraving is accomplished by means of special cutter and pantograph mechanism.

Maximum area covered by cutter point on 1:1 reduction is a circle of 150 mm in diameter.

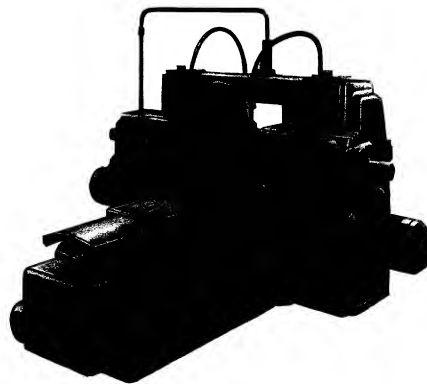
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SPECIFICATIONS

Capacity		Speeds and Feeds	
Reduction range	1:1—1:50	Number of spindle speeds . .	4
Distance from spindle nose to work table surface, mm:		Range of spindle speeds, r. p. m.	2980—12060
Minimum	0	Drive	
Maximum	250	220/380 volt, 3 phase, 50 cycle	
Work Table		A. C. motor:	
Working surface, mm	200 × 300	Power, kg	0.15
Maximum table traverse, mm:		Speed, r. p. m.	3000
Longitudinal	175	Space Occupied	
Cross	100	Floor space, mm	1020 × 600
Vertical	250	Height of machine, mm . . .	1250
Template Table		Weight	
Working surface, mm	300 × 450	Net weight, kg	approx. 270

TWO-HEAD PLANER TYPE
MILLING MACHINE

MODEL 6622



The 6622 Two-Head Planer Type Milling Machine is designed for fast production on steel and cast-iron parts with flat surfaces to be milled using face milling cutters.

Two side heads can be used for machining at the same time. The heads are completely self-contained units with independent set-up and feed movements and are powered by individual motors. The machine is operated by means of push-button control built into the main pendant station.

Independent feed and rapid traverse with automatic cycle set-up are provided for the table.

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СТАНКОИМПОРТ

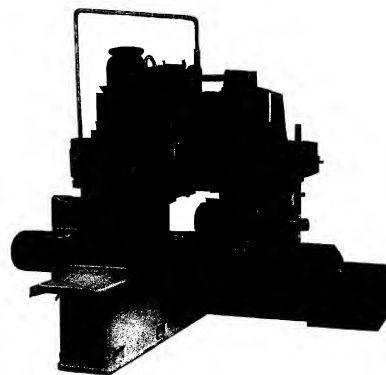
SPECIFICATIONS

Capacity		Number of table feeds . . .	18
Distance between head spindle faces, mm:		Range of table feeds, mm/min.	20—1000
Minimum	300	Number of head vertical feeds	2
Maximum	650	Head vertical feeds, mm/min.	63: 200
Distance from center line of head spindle to top of table, mm:		Rapid table traverse, m/min. .	4
Minimum	75	Drive	
Maximum	400	220/380 volt, 3 phase, 50 cycle	
Distance between housings, mm	820	A.C. motors:	
Table		Main drive (2 motors):	
Working surface of table, mm	1600 × 450	Power, kW	7
Maximum table travel, mm . .	1600	Speed, r. p. m.	1500
Speeds and Feeds		Table feed drive:	
Number of each spindle speeds	18	Power, kW	1.7
Range of spindle speeds, r. p. m.	25—1250	Speed, r. p. m.	1500
		Space Occupied	
		Floor space, mm	4450 3020
		Height of machine, mm . . .	2115
		Weight	
		Net weight, kg	approx. 7900

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THREE-HEAD PLANER TYPE
MILLING MACHINE

MODEL 6632



The 6632 Three-Head Planer Type Milling Machine is designed for fast production on steel and cast-iron parts with flat surfaces to be milled using face milling cutters.

One rail head and two side heads can be used for machining at the same time. All heads are completely self-contained units with independent set-up and feed movements and are powered by individual motors. All three heads are of swivelling type.

Automatic rail lowering and elevating mechanism is provided. It is operated by means of push-button control built into the main pendant station.

Independent feed and rapid traverse are provided for the table, and automatic cycle set-up can be furnished on special request. If necessary the table may be stopped automatically at the end of working stroke. The machine is equipped with seven electric motors.

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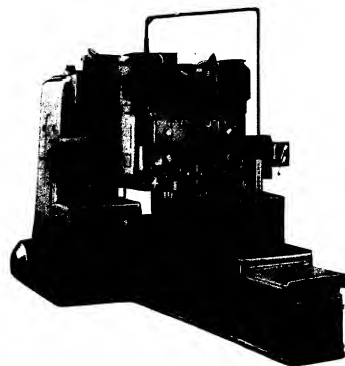
SPECIFICATIONS

Capacity		Range of feeds, mm/min.:	
Height from rail head spindle face to top of table, mm.:		Table	19—950
Minimum	150	Spindle heads	9.5—475
Maximum	830	Rapid traverse, mm/min.:	
Distance from center line of side head spindle to top of table, mm.:		Table	3000
Minimum	100	Spindle heads	1500
Maximum	600	Speed of rail traverse, mm/min.:	600
Distance between side head spindle faces, mm.:		Drive	
Minimum	375	220/380 volt, 3 phase, 50 cycle	
Maximum	775	A. C. motors:	
Distance between housings, mm.	950	Main drive (3 motors):	
Table		Power, kW	10
Working surface of table, mm	2200 x 650	Speed, r. p. m.	1500
Maximum table travel, mm	2200	Table feed drive:	
Spindle Heads		Power, kW	4.5
Number of rail heads	1	Speed, r. p. m.	1500
Number of side heads	2	Rapid traverse drive:	
Maximum angle of swivel of spindle heads	± 30°	Power, kW	4.5
Spindle nose acc. to GOST 836-47		Speed, r. p. m.	1500
Speeds and Feeds		Rail traverse drive:	
Number of each spindle speeds	12	Power, kW	4.5
Range of each spindle speeds, r. p. m.	475—600	Speed, r. p. m.	1500
Number of table and heads feeds	18	Coolant pump:	
		Power, kW	0.15
		Speed, r. p. m.	3000
		Space Occupied	
		Floor space, mm	5900 x 4350
		Height of machine, mm	3360
		Weight	
		Net weight, kg approx.	23000

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FOUR-HEAD PLANER TYPE
MILLING MACHINE

MODEL 6642



The 6642 Four-Head Planer Type Milling Machine is designed for fast production of steel and cast-iron parts with flat surfaces to be milled using face milling cutters.

Two rail heads and two side heads can be used for machining at the same time. All heads are completely self-contained units with independent set-up and feed movements and are powered by individual motors.

All four heads are of swivelling type.

Automatic rail lowering and elevating mechanism is provided. It is operated by means of push-button control built into the main pendant station.

Independent feed and rapid traverse are provided for the table, and automatic cycle set-up can be furnished on special request. If necessary the table may be stopped automatically at the end of working stroke.

The machine is equipped with eight electric motors.

СТАНКОИМПОРТ

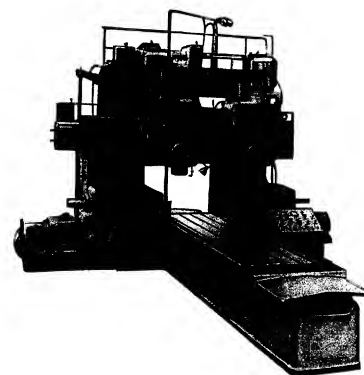
SPECIFICATIONS

Capacity		Number of table and head feeds	18
Height from rail head spindle face to top of table, mm:		Range of feeds, mm/min:	
Minimum	150	Table	19—950
Maximum	1000	Spindle heads	9.5—475
Distance between rail head spindles, mm:		Rapid traverse, mm/min:	
Minimum	450	Table	3000
Maximum	1600	Spindle heads	1500
Distance between side head spindle faces, mm:		Speed of rail traverse, mm/min.	600
Minimum	675	Drive	
Maximum	1075	220/380 volt, 3 phase, 50 cycle	
Distance from center line of side head spindle to top of table, mm:		A. C. motors:	
Minimum	75	Main drive (four motors):	
Maximum	800	Power, kW	14
Distance between housings, mm	1250	Speed, r. p. m.	1500
Table		Table feed drive:	
Working surface of table, mm	3000 × 900	Power, kW	4.5
Maximum table travel, mm .	3000	Speed, r. p. m.	1500
Spindle Heads		Rail traverse drive:	
Number of rail heads	2	Power, kW	7
Number of side heads	2	Speed, r. p. m.	1500
Maximum swivel of spindle heads	± 30°	Rapid traverse drive:	
Spindle nose acc. to GOST 836-47		Power, kW	4.5
Speeds and Feeds		Speed, r. p. m.	1500
Number of each spindle speeds	12	Coolant pump:	
Range of each spindle speeds, r. p. m.	47.5—600	Power, kW	0.15
		Speed, r. p. m.	3000
		Space Occupied	
		Floor space, mm	7650 × 4650
		Height of machine, mm	3000
		Weight	
		Net weight, kg	approx. 31000

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FOUR-HEAD PLANER TYPE
MILLING MACHINE

MODEL 6652



The 6652 Four-Head Planer Type Milling Machine is designed for regular and high speed milling on steel and cast-iron parts using face milling cutters.

Two rail heads and two side heads can be used for machining at the same time. All heads are completely self-contained units with independent set-up adjustment, infinitely variable feed, and are powered by individual motors.

All four heads are of swivelling type.

Change of spindle speeds is accomplished by means of hand operated levers.

Infinitely variable table feed is provided by the use of D. C. electric motor for feed drive. From the feed box movement is transmitted to the main worm, driving the table.

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Start and stop of the main drive motors and the table drive motors are by means of push-buttons on the pendant station. Reserve of spindles and adjustment of table feed are made from a centralized control station. Spindle heads feed movement is interlocked with the movement of the table and is controlled from the centralized control station by means of hydraulically operated and electrically controlled mechanisms.

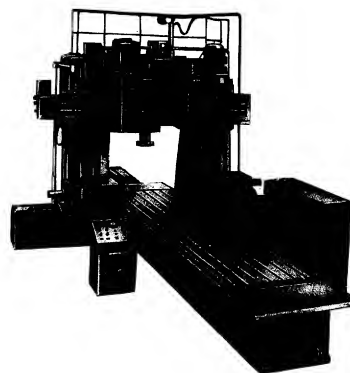
Rail clamping to the housings and spindle heads clamping to the rail are made from the centralized control station.

SPECIFICATIONS

Capacity		Speeds and Feeds	
Height from rail head spindle face to top of table, mm:		Number of each spindle speeds	12
Minimum	200	Range of spindle speeds, r. p. m.	37.5—475
Maximum	1400	Range of feeds, mm/min.:	
Distance between rail head spindles, mm:		Table	23.5—1180
Minimum	550	Spindle heads	11.8—590
Maximum	2350	Rapid traverse, mm/min.:	
Distance between side head spindle faces, mm:		Table	4000
Minimum	850	Spindle heads	2000
Maximum	1400	Speed of rail traverse, mm/min.	600
Distance from center line of side head spindle to top of table, mm:		Drive	
Minimum	155	220/380 volt, 3 phase, 50 cycle A. C. motors:	
Maximum	1070	Main drive (four motors):	
Maximum weight of work piece admitted, kg	8000	Power, kW	20
		Table rapid traverse drive:	
		Power, kW	13.5
		Rail traverse drive:	
		Power, kW	14
		D.C. motor for table feed:	
		Power, kW	10
Table		Space Occupied	
Working surface of table, mm	4250 × 1250	Floor space, mm	11150 × 5600
Maximum table travel, mm	4500	Height of machine, mm	4600
Spindle Heads		Weight	
Number of rail heads	2	Net weight, kg	approx. 64000
Number of side heads	2		
Maximum swivel of spindle heads	± 30°		
Maximum diameter of face milling cutters, mm	400		

FOUR-HEAD PLANER TYPE MILLING MACHINE

MODEL 6662



The 6662 Four-Head Planer Type Milling Machine is designed for regular and high speed milling on steel and cast-iron parts using face milling cutters. Two rail heads and two side heads can be used for machining at the same time.

All heads are completely self-contained units with independent set-up adjustment, infinitely variable feed, and are powered by individual motors. All four heads are of swivelling type.

Change of spindle speeds is accomplished by means of hand operated levers. Infinitely variable table feed is provided by the use of D. C. electric motor for feed drive. From the feed box movement is transmitted to the main worm driving the table.

Start and stop of the main drive motors and the table drive motors are by means of push-buttons on the pendant station.

Reverse of spindles and adjustment of table feed are made from a centralized control station.

Spindle heads feed movement is interlocked with the movement of the table and is controlled from the centralized control station by means of hydraulically operated and electrically controlled mechanisms.

Rail clamping to the housings and spindle heads clamping to the rail are made from the centralized control station.

SPECIFICATIONS

Capacity		Speeds and Feeds	
Height from rail head spindle face to top of table, mm:		Number of each spindle speeds	12
Minimum	200	Range of spindle speeds, r. p. m.	37.5—475
Maximum	1900	Range of feeds, mm/min:	23.5—1180
Distance between rail head spindles, mm:		Table	11.8—590
Minimum	550	Spindle heads	4000
Maximum	2900	Rapid traverse, mm/min:	2000
Distance between side head spindle faces, mm:		Table	600
Minimum	1400	Spindle heads	
Maximum	1950	Speed of rail traverse, mm/min.	
Distance from center line of side head spindle to top of table, mm:			
Minimum	155	Drive	
Maximum	1550	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Maximum weight of work piece admitted, kg	14000	Main drive (four motors):	
		Power, kW	28
		Table rapid traverse drive:	
		Power, kW	13.5
		Rail traverse drive:	
		Power, kW	14
		D.C. motor for table feed:	
		Power, kW	10
		Space Occupied	
		Floor space, mm	14600 × 6050
		Height of machine, mm	5100
		Weight	
		Net weight, kg	approx. 80000

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UNIVERSAL MILLING MACHINE

MODEL 678M



The 678M Universal Milling Machine is designed for use in tool room where great accuracy and versatility are required. The spindle speed changes are obtained through a gear box.

Power feeds as well as hand feeds are provided for both longitudinal and vertical movements of the table. The feed changes are obtained through a feed box. Table stop is accomplished either automatically by means of adjustable dogs or by hand.

Cross movement of spindle ram is by hand only.

The attachments supplied with each machine include: plain horizontal table, universal swivelling table, circular dividing table, universal dividing head with accessories, vertical swivelling milling head, universal swivelling vice, etc.

СТАНКОИМПОРТ

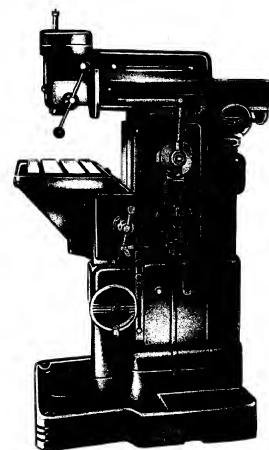
SPECIFICATIONS

Capacity		Speeds and Feeds	
Distance, plain table to center line of horizontal spindle, mm:		Number of spindle speeds	6
Minimum	68	Range of speeds, r. p. m.:	
Maximum	348	Horizontal spindle	120—1170
Maximum distance, spindle face to arbor support bushing, mm	178	Vertical spindle	178—1740
Maximum distance, main table surface to face of spindle	280	Number of table feeds	6
Distance, center line of horizontal spindle to overarm, mm	65	Range of table feeds, mm/min.:	
		Longitudinal	19—184
		Vertical	22—214
Table		Drive	
Working surface of main table, mm	550 × 195	220/380 volt, 3 phase, 50 cycle A.C. motors:	
Maximum travel of table (power and hand), mm:		Main and feed drive:	
Longitudinal	250	Power, kW	1.7
Vertical	280	Speed, r. p. m.	1500
		Coolant pump:	
		Power, kW	0.125
		Speed, r. p. m.	3000
Spindle Ram		Space Occupied	
Maximum cross travel of ram, mm	140	Floor space, mm	970 × 1090
Taper hole in spindle	Morse No. 4	Height of machine, mm	1525
		Weight	
		Net weight, kg	approx. 825



UNIVERSAL MILLING MACHINE

MODEL 679



The 679 Universal Milling Machine is designed for use in tool rooms where great accuracy and versatility are required.

Change of spindle speeds, table feeds and cross feeds of horizontal spindle ram are obtained through gear box and feed box with a single lever operating mechanisms.

Power feeds are provided for both longitudinal and vertical movement of the table. Power cross feed is accomplished by horizontal spindle ram only.

A great versatility of the machine is provided by a number of attachments supplied with the machine. It includes: vertical spindle, circular dividing table, universal swivelling table, dividing head, machine vice, etc.

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SPECIFICATIONS

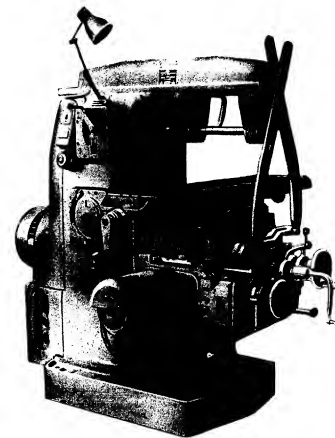
Capacity		Taper hole of vertical spindle Morse No. 4	
Distance, plain table surface to center line of horizontal spindle, mm:			
Minimum	30	Speeds and Feeds	
Maximum	360	Number of spindle speeds	8
Distance, plain table surface to face of vertical spindle, mm:		Range of speeds, r. p. m.:	
Minimum	0	Horizontal spindle	110—1230
Maximum	265	Vertical spindle	150—1660
Distance, face of horizontal ram to center line of vertical spindle, mm	155	Number of table and ram feeds	8
Table		Range of table longitudinal and vertical feeds, mm/min.	25—285
Working surface of main table, mm	700 × 260	Range of horizontal spindle ram feeds, mm/min.	25—285
Maximum travel of table, mm:		Drive	
Longitudinal	300	220/380 volt, 3 phase, 50 cycle A. C. motor:	
Vertical	300	Power, kW	2.8
Spindle Ram		Speed, r. p. m.	1500
Maximum cross travel of spindle ram, mm	200	Space Occupied	
Maximum travel of vertical spindle along its axis (manual), mm	80	Floor space, mm	1150 × 1400
Taper hole of horizontal spindle Morse No. 4		Height of machine, mm	1650
		Weight	
		Net weight, kg:	
		Without accessories	approx. 1050
		Including accessories	approx. 1250

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UNIVERSAL MILLING MACHINE

MODEL 6H8t



The 6H8t Universal Milling Machine has been designed for miscellaneous milling operations encountered in the tool room, using various types of cutters such as plain and helical cylindrical cutters, side milling cutters, end mills, form cutters, etc.

The employment of a universal dividing head or some special attachments increases the variety of work that may be assigned to the machine, including spur and helical gears, worms, worm wheels, bevel gears, racks, etc.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools.

СТАНКОИМПОРТ

The machine is supplied with a climb cutting device which eliminates backlash in the table feed screw; thus, either climb or conventional milling operations can be handled. Two separate motors are used for driving the spindle and feeding the table. Power feed and rapid traverse in three directions are provided for the table.

SPECIFICATIONS

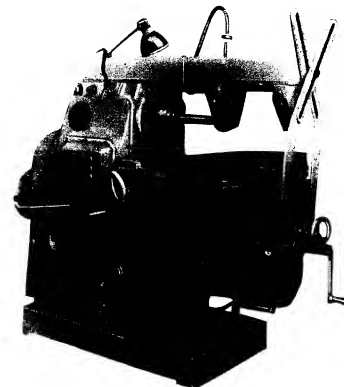
Capacity		Range of table feeds, mm/min.:	
Working surface of table, mm	1000 × 250	Longitudinal	35—980
Distance, center line of spindle to top of table, mm:		Cross	25—765
Minimum	0	Vertical	12—380
Maximum	340	Drive	
Distance, face of column to center line of table, mm:		220/380 volt, 3 phase, 50 cycle	
Minimum	170	A.C. motors:	
Maximum	370	Main drive:	
Distance, center line of spindle to overarm, mm	150	Power, kW	4.5
Maximum table traverse, mm:		Speed, r. p. m.	1500
Longitudinal	500	Feed drive:	
Cross	200	Power, kW	1.7
Vertical	340	Speed, r. p. m.	1500
Maximum table swivel	± 45°	Coolant pump:	
		Power, kW	0.1
		Speed, r. p. m.	3000
Speeds and Feeds		Space Occupied	
Number of spindle speeds	16	Floor space, mm	2060 × 1940
Range of spindle speeds, r. p. m.	65—1800	Height of machine, mm	1600
Number of table feeds	16	Weight	
		Net weight, kg	approx. 2000

СТАНКОИМПОРТ



UNIVERSAL MILLING MACHINE

MODEL 6H82



The 6H82 Universal Milling Machine has been designed for miscellaneous milling operations encountered in the tool room, using various types of cutters such as plain and helical cylindrical cutters, side milling cutters, end mills, etc.

The employment of a universal dividing head or some special attachments increases the variety of work that may be assigned to the machine including spur and helical gears, worms, worm wheels, bevel gears, racks, etc.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools.

The machine is supplied with a climb cutting device which eliminates backlash in the table feed screw; thus either climb or conventional milling

СТАНКОИМПОРТ

operations can be handled. Two separate motors are used for driving the spindle and feeding the table.

Dial selectors are provided for quick change of spindle speeds and table feeds. Power feed and rapid traverse in three directions are provided for the table. The machine can also be operated as an automatic cycle milling machine providing continuous or intermittent cycle to the longitudinal movement of the table.

Lever and push-button control located at the front of the machine is duplicated at the left-hand side for convenience in complete hand control.

SPECIFICATIONS

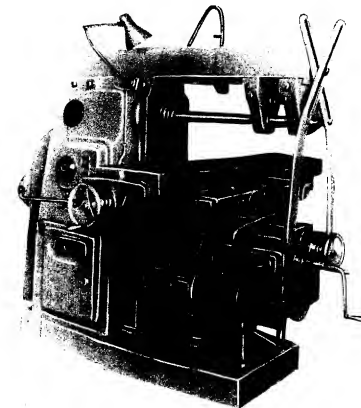
Capacity		Rapid traverse of table, mm/min.:	
Working surface of table, mm	1250 × 320	Longitudinal and cross	2300
Distance, center line of spindle to top of table, mm:		Vertical	770
Minimum	30	Drive	
Maximum	350	A.C. motors:	
Spindle nose No. 3, acc. to GOST 836-47		Main drive:	
Maximum table traverse, mm:		Power, kW	7
Longitudinal	700	Speed, r.p.m.	1500
Cross	280	Feed drive:	
Vertical	320	Power, kW	1.7
Swivel of table	± 45	Speed, r.p.m.	1500
Speeds and Feeds		Space Occupied	
Number of spindle speeds	18	Floor space, mm	2100 × 1740
Range of spindle speeds, r.p.m.	30—1500	Height of machine, mm	1615
Number of table feeds	18	Weight	
Range of table feeds, mm/min.:		Net weight, kg	approx. 2800
Longitudinal and cross	23.5—1180		
Vertical	8—390		

СТАНКОИМПОРТ



UNIVERSAL MILLING MACHINE

MODEL 6H83



The 6H83 Universal Milling Machine has been designed for miscellaneous milling operations encountered in the tool room, using various types of cutters such as plain and helical cylindrical cutters, side milling cutters, end mills, form cutters, etc.

The employment of a universal dividing head or some special attachments increases the variety of work that may be assigned to the machine including spur and helical gears, worms, worm wheels, bevel gears, racks, etc.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools. The machine is supplied with a climb cutting device which eliminates backlash in the table feed screw; thus either climb or conventional milling operations can be handled.

СТАНКОИМПОРТ

Dial selectors are provided for quick change of spindle speeds and table feeds. Power feed and rapid traverse in three directions are provided for the table. The machine can also be operated as an automatic cycle milling machine, providing continuous or intermittent cycle to the longitudinal movement of the table.

Lever and push-button control located at the front of the machine is duplicated at the left-hand side for convenience in complete hand control.

SPECIFICATIONS

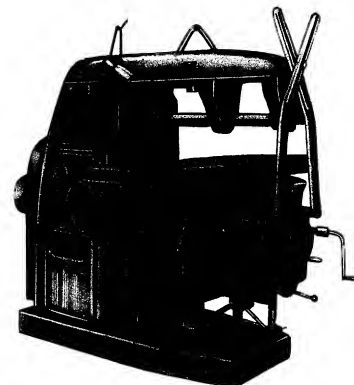
Capacity		Rapid traverse of table, mm/min.:	
Working surface of table, mm	1250 × 320	Longitudinal and cross	2300
Distance, center line of spindle to top of table, mm:		Vertical	770
Minimum	30	Drive	
Maximum	400	A. C. motors:	
Spindle nose No. 3, acc. to GOST 836-47		220/380 volt, 3 phase, 50 cycle	
Maximum table traverse, mm:		Main drive:	
Longitudinal	700	Power, kW	7
Cross	260	Speed, r. p. m.	1500
Vertical	370	Feed drive:	
		Power, kW	1.7
		Speed, r. p. m.	1500
Speeds and Feeds		Space Occupied	
Number of spindle speeds . .	18	Floor space, mm	2100 × 1740
Range of spindle speeds, r. p. m.	30—1500	Height of machine, mm . . .	1615
Number of table feeds . . .	18	Weight	
Range of table feeds, mm/min.:		Net weight, kg approx. 2700	
Longitudinal and cross	23.5—1100		
Vertical	8—300		

СТАНКОИМПОРТ



HORIZONTAL MILLING MACHINE

MODEL 6H83Г



The 6H83Г Horizontal Milling Machine has been designed for miscellaneous milling operations in both tool room and production lines using various types of cutters such as plain and helical cutters, side milling cutters, form cutters, etc.

With the employment of special attachments spur and bevel gears and racks can be machined.

The modern design of the machine, its rigidity, ample power together with the high speeds and feeds provide all the operating conditions for the application of cemented carbide cutting tools.

The machine is supplied with a climb cutting device which eliminates backlash in the table feed screw; thus either climb or conventional milling operations can be handled.

СТАНКОИМПОРТ

Two separate motors are used for driving the spindle and feeding the table.

Dial selectors are provided for quick change of spindle speeds and table feeds.

Power feed and rapid traverse in three directions are provided for the table.

The machine can also be operated as an automatic cycle milling machine providing continuous or intermittent cycle to the longitudinal movement of the table.

Lever and push-button control located at the front of the machine is duplicated at the left-hand side for convenience in complete hand control.

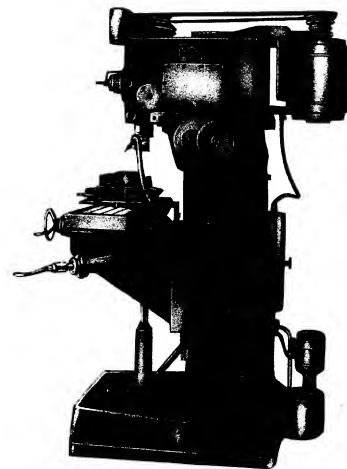
SPECIFICATIONS

Capacity		Rapid traverse of table, mm/min.:	
Working surface of table, mm	1600 x 400	Longitudinal and cross	2300
Distance, center line of spindle to top of table, mm:		Vertical	770
Minimum	30	Drive	
Maximum	450	A. C. motors:	
Spindle nose No. 3, acc. to GOST 836-47	220/380 volt, 3 phase, 50 cycle	Main drive:	
Maximum table traverse, mm:		Power, kW	10
Longitudinal	900	Speed, r. p. m.	1500
Cross	320	Feed drive:	
Vertical	420	Power, kW	2.8
		Speed, r. p. m.	1500
Speeds and Feeds		Space Occupied	
Number of spindle speeds	18	Floor space, mm	2370 x 2140
Range of spindle speeds, r. p. m.	30—1500	Height of machine, mm	1760
Number of table feeds	18	Weight	
Range of table feeds, mm/min.:		Net weight, kg	
Longitudinal and cross	23.5—1180	approx. 3700	
Vertical	8—300		

СТАНКОИМПОРТ

VERTICAL KEYWAY MILLING MACHINE

MODEL 692A



The 692A Vertical Keyway Milling Machine is designed for milling keyways on shafts and other work pieces.

The sinking infeed of the cutter spindle, its rapid raising and lowering movements, as well as the reciprocating motion of the spindle carriage are hydraulically performed.

Milling keyways is accomplished through an automatic cycle, comprising: reciprocating longitudinal motion of spindle carriage and down feed of

СТАНКОИМПОРТ

cutter at each successive stroke. The spindle carriage can be set in any initial position.

The machine is driven by a two-speed motor through V-belt.

SPECIFICATIONS

Capacity		Range of carriage speeds (in- finitely variable) mm/min.		450—1200
Maximum width of keyway, mm	20	Range of vertical feeds (infini- tely variable), mm per stroke		0.05—0.5
Length of keyway without resetting, mm	300			
Table		Drive		
Working surface of table, mm	900 × 250	220/380 volt, 3 phase, 50 cycle A. C. motor (two-speed):		
Cross travel of table (by hand), mm	150	Main drive:		
Vertical travel of table (by hand), mm	300	Power, kW 3.5/4.5 Speeds, r. p. m. 750/1500		
Spindle		Space Occupied		
Maximum travel of spindle sleeve, mm	100	Floor space, mm 1400 × 1350 Height of machine, mm 1750		
Speeds and Feeds		Weight		
Number of spindle speeds . .	12			
Range of spindle speeds, r. p. m.	270—3380	Net weight, kg approx. 1300		

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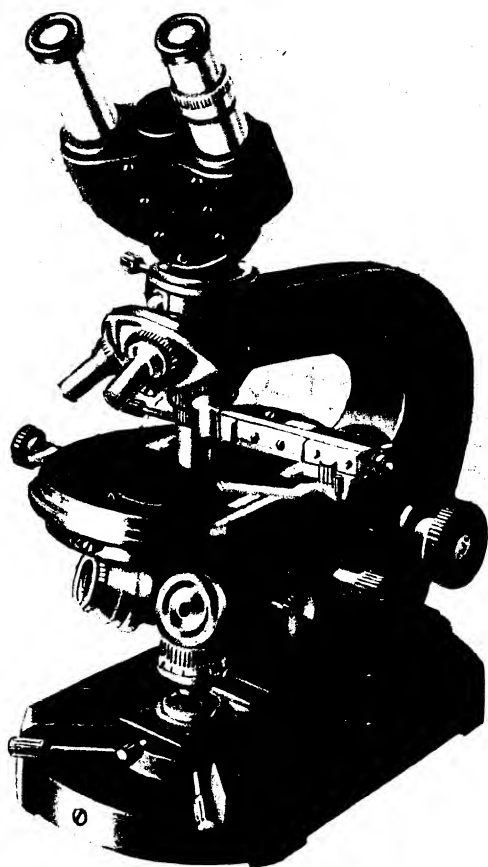
"STANKOIMPORT"

EXPORTS AND IMPORTS:

Machine Tools
Woodworking Machinery
Metal Working Machinery (Presses, Hammers, Shears, Cold
Forming Machines, Punching Machines)
Rolling Mills (imports)
Measuring Instruments and Apparatus (for metal industry)
Testing Machines and Instruments (for metals)
Optical Instruments and Equipment
Portable Electric and Pneumatic Tools (for metal and woodwork-
ing)
Metal and Wood Cutting Tools
Mechanic's Tools and Chucks
Sintered Carbide and Hard-Alloy Products
Abrasive Products
Ball and Roller Bearings
Microscopes of All Types
Motion-Picture Equipment and Accessories
Geodetic Instruments and Equipment
Photographic Cameras
Binoculars
Magnifiers
Lenses
Crude Optical Glass Blocks and Blanks

Design and specifications of the machine tools illustrated
herein are subject to change without notice.

Vseshtorgizdat Order N 158



VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

MICROSCOPES

BIOLOGICAL MICROSCOPES
POLARIZING MICROSCOPES
METALLOGRAPHIC MICROSCOPES
ELECTRON MICROSCOPES



VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

"STANKOIMPORT"

U S S R

MOSCOW

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BIOLOGICAL MICROSCOPES

As a rule, microscopes designed for the examination of translucent objects, illuminated by transmitted light, are called biological microscopes.

Translucent specimens may be examined in either a bright or dark field.

The biological microscope may also be employed for the examination of opaque objects in low power work using an epicondenser.

The fields of application of biological microscopes are exceptionally wide. Botany, zoology, biochemistry, medicine, agriculture, industrial laboratories are a far from complete list of those branches of science and economy in which biological microscopes have found wide-spread use.

In accordance with the field of application and the type of research, the biological microscopes may be furnished with special accessories and devices enlarging their operating capacity.

BIOLOGICAL MICROSCOPE, MODEL M-10

The M-10 Microscope (Fig. 1) is a medium type biological microscope, designed for use in biological and other laboratories, clinics, universities and scientific research institutions.

This microscope satisfies the chief requirements of the biologist, physician or agronomist. Magnifications achieved by the various combinations of objectives and eyepieces range from 56 \times to 600 \times .

Fig. 2 shows a diagrammatical sectional view of the microscope.

The base 1 of the stand is of horse-shoe form and has three supporting pads which provide a stable position of the microscope on the table.

The weight of the base is such that the microscope is kept from upsetting even when the limb 2 is in a horizontal position.

To protect the stand from falling over from accidental side blows, two additional lugs are provided, underneath, between the main supporting pads.



Fig. 1
M-10 Biological Microscope



The vertical extension of the base is fitted into the slot of the limb 2. The latter has the form of a segment.

The limb is pivoted on the base with the pin 3 and can be inclined to any angle convenient for observation.

By the aid of a special wrench, furnished with the microscope, the effort required for tilting the limb can be regulated. In this way the desirable position of the body 4 in relation to the observer can be ensured.

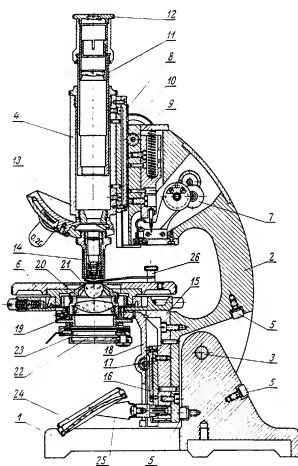


Fig. 2
Diagrammatical sectional view of M-10 Microscope

The total travel of the body due to the fine focusing mechanism equals 2.4—2.5 mm (24—25 revolutions of the heads). This travel is limited by a special restricting device. The extreme positions of the body are determined by two scratches on the limb. The reference mark on the movable part of the body indicates its position in relation to the limb under the action of the fine focusing mechanism. The fine motion mechanism displaces the body together with the coarse focusing mechanism.

The coarse focusing mechanism comprises a rack 8 fastened to the body and a pinion 9 engaging the rack.

The stop screws 5 provide for setting the body in a precise vertical or horizontal position.

The cut-out portion in the center of the limb allows the latter to be used as a convenient handle for carrying the microscope from place to place.

The space, provided by this same cut-out portion, allows objects having a large lateral size (for instance, flat plates or pans) to be set up on the stage 6.

The upper part of the limb carries the fine focusing mechanism 7.

The fine focusing mechanism comprises a system of gears and a lever. It is actuated by two heads arranged on the right- and left-hand side of the limb. One revolution of the heads, on which shaft the driving gear of the mechanism is mounted, advances the body 0.1 mm.

The left-hand head is furnished with a graduated drum having 30 divisions on its circumference. One drum scale division corresponds to a body movement of 0.002 mm.

Heads 10 are mounted on the pinion shaft 9. Rotating the heads raises or lowers the body. One full revolution of the heads 10 provides a body travel of 20 mm. Rotating the heads 10 away from the observer lowers the body and vice versa.

The tube is of the telescopic type. By extending the draw tube 11, the mechanical tube length can be varied in a range from 150 to 200 mm. A scale inscribed on the draw tube indicates the regulated tube length.

Interchangeable eyepieces 12 are inserted into the upper part of the tube. The standard microscope set contains Huyghenian eyepieces, designed in such a manner, that a change of eyepiece power does not affect the focusing adjustment. The initial magnification is engraved on each eyepiece.

The lower part of the body carries the revolving nosepiece 13 for holding and rapidly changing the objectives 14. Rotating the body of the nosepiece brings one of the objectives in line with the tube opening. The correct position of the objective is fixed by a spring click.

The revolving nosepiece and its objective holes are aligned with the microscope axis with such accuracy that on changing the higher powers, the specimen set in the center of the field of view with the low power objective always remains in the field of view of the consequently replaced high power objective. Besides this, when changing from one objective to another, the specimen always remains visible and only a small adjustment of the fine focusing heads is necessary to obtain a sharp image.

The standard microscope set includes achromatic objectives computed for a mechanical tube length of 160 mm and a cover-glass thickness of 0.17 mm. Each objective is stored in a plastics case on which the initial magnification and numerical aperture of the objective are engraved.

An angle shaped bracket 15, carrying the rack 16, is fastened by screws to the tail of the limb. This rack engages a pinion 17 mounted in the movable part 18 of the bracket.

The movable part of the bracket or substage carries the spring fitting 19 into which the mount 20 of the two-lens condenser 21 and the swing-out holder 22 of the filter 23 are inserted.

The pinion 17 and the rack 16 provide for vertical adjustment of the substage together with the condenser.

The design of the condenser adjustment provides a smooth movement with sufficient friction to prevent the substage 18 from running down under its own weight.

The upward movement of the condenser is limited by a stop screw in such manner, that in the extreme upper position of the substage a space remains, between the front lens of the condenser and the object stage, to introduce an oil-immersion fluid used in some cases.

The two-lens condenser 21 has a maximum numerical aperture of 1.2. The condenser is furnished with an iris diaphragm and operates in conjunction with the plain and concave mirror 24.

The fork-shaped mirror holder 25 allows either mirror surface to be directed toward the source of light.

The object stage 6 of the microscope is fastened to the stationary part of bracket 15. The stage is circular and its upper part has rotary and centring movements actuated by special screws.

The stage clips 26, inserted into holes provided in the upper part of the stage, serve to clamp the specimen.



If required, the condenser in its mount 20 may be removed from the spring fitting 19 and replaced by some other condenser or by cylindrical diaphragms.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on top for carrying.

There are sliding holders in the case for storing objectives and eyepieces, as well as a box for clips, filters, spare wrench and other accessories.

SPECIFICATIONS

Range of total magnification	from 56 \times to 600 \times
Achromatic objectives:	8 \times 40 \times
initial magnification	8 \times 40 \times
numerical aperture	0.20 0.65
focal length, mm	18.2 4.35
working distance, mm	8.91 0.6
field of view with 10 \times eyepiece, mm	1.75 0.35
Huyghenian eyepieces:	7 \times 10 \times 15 \times
magnification	7 \times 10 \times 15 \times
focal length, mm	36 25 17
linear field of view, mm	18 14 8
Objective changer	double revolving nosepiece
Body tube variable length, mm	from 150 to 200
Focusing adjustments:	
coarse	by rack and pinion
fine	micrometric mechanism, reading to 0.002 mm
Illuminating system	reversible mirror plane and concave two-lens condenser 1.2 N.A. with iris diaphragm and interchangeable filter
Object stage	circular, with centring and rotating adjustments
Overall dimensions of microscope (height \times length \times width), mm	315 \times 190 \times 170
Overall dimensions of case, mm	350 \times 250 \times 195
Weight of microscope, kg	7.9
Weight of microscope in case, kg	11.8

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb, body with coarse and fine focusing adjustments, revolving nosepiece, circular rotary object stage and illuminating system

Achromatic objective, 8 \times 0.20, in case

Achromatic objective, 40 \times 0.65, in case

Huyghenian eyepiece, 7 \times

Huyghenian eyepiece, 10 \times

Huyghenian eyepiece, 15 \times

Opal glass

Blue filter

Clips for holding specimens (2 pieces)

Wrenches for adjustment (2 pieces)

Flannel napkin

Squirrel-hair brush

Case for microscope

Box for microscope accessories

Description and instruction manual

Certificate

SCHOOL MICROSCOPE, MODEL MV

The MV School Microscope (Fig. 3) is a medium type biological microscope constructed on the basis of the M-10 microscope.

The School Microscope is designed for the use of students of biological, medical and agricultural institutions as well as for studies in public and technical schools. Model MV is considerably simplified in comparison with model M-10.

The revolving nosepiece for changing objectives is absent in the simplified model. A bushing, of the same height as the revolving nosepiece, is screwed into the body instead of it. Either of the two objectives, furnished with the microscope, can be screwed into the bushing.

A circular stationary object stage with two clips for holding specimens is substituted on the school microscope for the rotary stage. The sub-stage vertical adjustment is absent on this microscope and the condenser has been replaced by interchangeable cylindrical diaphragms of various diameter.

Two achromatic objectives and two Huyghenian eyepieces are furnished with the instrument.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on top for carrying.

If desired, various accessories may be furnished on special order with the school microscope to provide more universal application.

Experience has shown that the school microscope meets the requirements of schools and colleges and provides the possibility of familiarizing students and pupils with the principles of microscopy and the chief methods of its procedure.



Fig. 3
MV School microscope

SPECIFICATIONS

Range of total magnification	from 80 \times to 600 \times
Achromatic objectives	8 \times and 40 \times (optical data same as for Model M-10 objectives)
Huyghenian eyepieces	10 \times and 15 \times (optical data same as for Model M-10 eyepieces)
Object stage	circular, stationary, with clips
Focusing adjustments:	
coarse	by rack and pinion
fine	micrometric mechanism without graduated drum
Illuminating system	reversible mirror plane and concave and three interchangeable diaphragms of 1, 3 and 6 mm diameter
Overall dimensions of microscope (height \times length \times width), mm	315 \times 190 \times 170



Overall dimensions of case, mm	350 × 250 × 195
Weight of microscope, kg	7.75
Weight of microscope in case, kg	11.65

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb, body with coarse and fine focusing adjustments, stationary object stage with clips and mirror
 Achromatic objective, 8× × 0.20, in case
 Achromatic objective, 40× × 0.65, in case
 Huyghenian eyepiece, 10×
 Huyghenian eyepiece, 15×
 Interchangeable diaphragms (3 pieces)
 Clips for holding specimens (2 pieces)
 Wrench for adjustment
 Flannel napkin
 Squirrel-hair brush
 Case for microscope
 Box for microscope accessories
 Description and instruction manual
 Certificate

MEAT INSPECTION MICROSCOPE, MODEL MHC-7

The MHC-7 Meat Inspection Microscope (Fig. 4) is a medium type biological microscope constructed on the basis of the M-10 microscope.

The Meat Inspection Microscope is designed for the inspection of meat to determine the presence of trichina and finds wide application in the food-stuffs industry and in sanitary inspection.

In comparison with the M-10 microscope the Meat Inspection Microscope has a number of simplifications in design concerning the object stage, limb, body, revolving nosepiece and illuminating system.

The instrument has a straight body of invariable tube length. The body is supplied with a coarse focusing mechanism. The revolving nosepiece is replaced by a bushing into which the objectives are screwed.

The illuminating system — without condenser and adjustable substage — comprises a reversible plane and concave mirror fastened on a pivoted fork-shaped holder and three interchangeable cylindrical diaphragms of various diameter.

The stationary object stage is rectangular in form and the compressing slide (Fig. 5) is moved about on its surface.

The compressing slide of the Meat Inspection Microscope comprises two plates of thick glass fastened together by two screws. It serves to flatten out the specimens of meat and sinew which are being examined for the presence of trichina.

The compressing slide can be moved by hand on the stage along a straight-edge. This allows all of the specimens, between the glass plates, to be examined. Rectangles with numerals from 1 to 28 are engraved on both the lower and upper plates. The inspected specimens are arranged inside these rectangles.

The microscope is furnished with two achromatic objectives and one Huyghenian eyepiece.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on top for carrying.



Fig. 4
MHC-7 Meat Inspection
Microscope



Fig. 5
Compressing Slide



SPECIFICATIONS

Range of total magnification	from 25.9 \times to 56 \times
Achromatic objectives:	3.7 \times 8 \times
initial magnification	3.7 \times 8 \times
numerical aperture	0.11 0.20
focal length, mm	33.1 18.2
working distance, mm	27.7 8.91
Huyghenian eyepiece	7 \times (optical data same as for Model M-10 eyepiece)
Object stage	stationary, rectangular, size: 100 \times 170 mm
Focusing adjustment	by rack and pinion
Illuminating system	reversible plane and concave mirror and three interchangeable diaphragms of 1, 3 and 6 mm diameter
Size of compressing slide, mm	50 \times 220
Overall dimensions of microscope (height \times length \times width), mm	315 \times 190 \times 170
Overall dimensions of case, mm	350 \times 250 \times 195
Weight of microscope, kg	7.55
Weight of microscope in case, kg	11.65

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb, body with coarse focusing adjustment, rectangular object stage with straight-edge and mirror

Achromatic objective, 3.7 \times \times 0.11, in case

Achromatic objective, 8 \times \times 0.20, in case

Huyghenian eyepiece, 7 \times

Interchangeable diaphragms (3 pieces)

Clips for holding specimens (2 pieces)

Compressing slide in case

Wrench for adjustment

Flannel napkin

Squirrel-hair brush

Case for microscope

Box for microscope accessories

Description and instruction manual

Certificate

TEXTILE MICROSCOPE, MODEL MHC-9

The MHC-9 Textile Microscope (Fig. 6) is a medium type biological microscope constructed on the basis of the M-10 microscope.

The Textile Microscope has found wide application in agricultural laboratories and in inspection stations of cotton manufacturing and textile factories.

The Textile Microscope differs from the M-10 model, in that, it has a simplified body, object stage and illuminating system.

The instrument has a straight body of invariable tube length. The microscope is furnished with a coarse focusing mechanism. The circular object stage is of the stationary type.

The revolving nosepiece is replaced by a bushing into which objectives are screwed.

Instead of a condenser, this microscope uses interchangeable cylindrical diaphragms. Two achromatic objectives and two eyepieces are furnished with the microscope.

The microscope is provided with a mechanical stage for shifting the inspected cotton fibre in a longitudinal direction.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on the top for carrying.

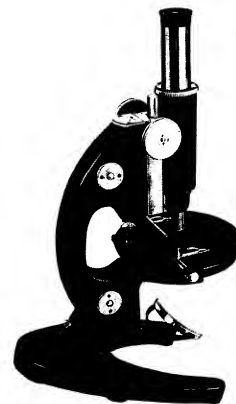


Fig. 6
MHC-9 Textile Microscope

SPECIFICATIONS

Range of total magnification	from 56 \times to 300 \times
Achromatic objectives:	8 \times 20 \times
initial magnification	8 \times 20 \times
numerical aperture	0.20 0.40
Huyghenian eyepieces	7 \times and 15 \times (optical data same as for Model M-10 eyepieces)
Object stage	circular, stationary type
Illuminating system	reversible plane and concave mirror and three interchangeable diaphragms, of 1, 3 and 6 mm diameter
Overall dimensions of microscope (height \times length \times width), mm	315 \times 190 \times 170
Overall dimensions of case, mm	350 \times 250 \times 195
Weight of microscope, kg	7.8
Weight of microscope in case, kg	11.5



Transverse movement of mechanical stage, mm	75
Reading accuracy of mechanical stage scale, mm	0.1
Overall dimensions of mechanical stage case, mm	170 × 121 × 50
Weight of mechanical stage, kg	0.15

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb, body with coarse focusing adjustment, circular stationary object stage and mirror
 Achromatic objective, 8× × 0.20, in case
 Achromatic objective, 20× × 0.40, in case
 Huyghenian eyepiece, 7×
 Huyghenian eyepiece, 15×
 Interchangeable diaphragms (3 pieces)
 Mechanical stage in case
 Wrenches for adjustment (2 pieces)
 Clips for holding specimens (2 pieces)
 Plannel napkin
 Squirrel-hair brush
 Case for microscope
 Box for microscope accessories
 Description and instruction manual
 Certificate

BIOLOGICAL MICROSCOPE, MODEL MBH-1

The MBH-1 Microscope (Fig. 7) is a medium type biological microscope and is a further development and an improvement of the M-10 microscope.

This instrument provides for research microscopy with a magnification from 56× to 1350×; the latter value being the maximum useful power for optical microscopes.

A further increase in magnification is of no avail and even detrimental as it leads to a decrease in illumination without gain in raising the limit of the resolving power of the microscope, that is, the possibility of examining more minute details of the specimen.

The MBH-1 Microscope differs from the M-10 microscope chiefly in its form which possesses a number of distinct features in comparison with the earlier arrangement. It is lower in height than the M-10 model and has an inclined eyepiece tube which allows the observer to be comfortably seated at a table during operation.

The object stage is always horizontal. This is necessary when conducting research on liquids.

The coarse and fine focusing mechanisms are arranged at the lower end of the limb. This allows both arms to rest on the table during microscopy and decreases the fatigue of the observer.

The optical system (Fig. 8) of the MBH-1 Microscope differs from the M-10 model in that a prism 1, changing the path of the rays to an angle of 45° to the horizontal plane, is arranged between the objective and the eyepiece.

The main parts of the instrument are: base 2 of the stand, housing with fine focusing mechanism 3, object stage 4, limb 5, revolving nosepiece 6 on guides, inclined monocular body 7, condenser substage bracket 8, condenser 9, objectives 10 and eyepiece 11.

The base of the stand has a horse-shoe form and imparts high stability to the microscope.

The housing 3 is fastened by screws to the base. On one side it has guides for the condenser substage bracket 8 and on the other side, guides for the limb 5. The fine focusing mechanism is mounted inside the housing.

One revolution of the fine focusing head on whose shaft the driving gear of the mechanism is mounted, advances the body 0.1 mm. The total adjustment of the body, by means of the fine focusing mechanism, equals 2.2—2.4 mm.

The extreme positions of the body are determined by scratches on the base. A reference mark on the movable part and two scratches on the stationary part



Fig. 7
MBH-1 Biological Microscope



correspond to the extreme positions of the fine focusing adjustment. The fine focusing mechanism displaces the limb together with the coarse focusing mechanism.

The limb has the form of an arc. This allows large-sized objects to be placed on the microscope stage and also facilitates carrying the microscope from place to place.

The lower end of the limb has guides and a fitting with two heads 12, which serve for coarse focusing adjustment.

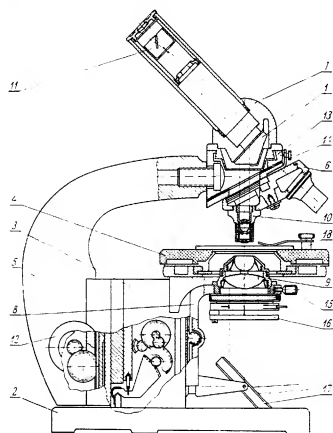


Fig. 8
Diagrammatical sectional view of the MEH-1 Microscope

The dimensions of the guides have been selected to provide a body travel of 50mm. One full revolution of the heads 12 corresponds to a movement of 20 mm.

The heads 12 have been designed so that, rotating one head in relation to the other regulates the smoothness of the movement to suit the observer.

The mounting 13 is fastened to the upper end of the limb. It has dovetail guides for the revolving nosepiece 6 and a socket for fastening the inclined monocular tube 7. A straight tube or a binocular attachment, the latter not included in the standard microscope set, but furnished on special order, can also be fastened in this mounting.

The inclined monocular tube can be rotated about a vertical axis and fixed in any position desired by the observer.

The lower end of the body comprises a spherical housing in which the prism 1 is arranged. The tube, in which the eyepiece 11 is inserted, is screwed into this housing in inclined position.

All the components of the inclined (or straight) tube are designed to provide a mechanical tube length of 160 mm.

The standard set contains Huyghenian eyepieces designed in a series so that a change in eyepiece power does not affect the focusing adjustments. The initial magnification is engraved on each eyepiece.

The straight tube, necessary for microphotography and other work, is included in the microscope set.

The revolving nosepiece, for holding and rapidly changing objectives, has four threaded holes for inserting objectives arranged in a spherical dish. The upper part of the revolving nosepiece is provided with dovetail guides for attachment to the mounting 13 on the limb.

The correct position of the revolving nosepiece in reference to the body axis is fixed by the screw 14. The spherical dish of this nosepiece can be rotated about its axis so that any of the four holes with its objective can be aligned with the body axis. A spring click device inside the revolving nosepiece centers each objective in reference to the optical axis of the microscope body. The alignment accuracy is such that on changing to higher powers the specimen set in the center of the field of view with the low power objective always remains in the field of view of the consequently replaced high power objective. When changing from one objective to another, the specimen always remains visible and only a small adjustment of the fine focusing head is necessary to obtain a sharp image.

The only exception, to the above, is the oil-immersion objective with a magnification of 90 \times . It has a working distance somewhat higher than for dry systems.

The standard set of the instrument includes three achromatic objectives computed for a mechanical tube length of 160 mm and a cover glass thickness of 0.17 mm. Each objective is stored in a plastics case to protect it from dust. The initial magnification and the numerical aperture are engraved on the mount and on the bottom of the case of each objective.

The condenser substage bracket 8 can be adjusted up to 20 mm by a rack and pinion. The substage carries a cylindrical spring fitting into which the condenser 9, in its mount, is fastened by means of screw 15.

A washer with two holes is arranged on the right-hand side of the condenser adjustment mechanism. Rotating this washer with a special wrench, provided with the microscope, adjusts the friction of the substage movement to prevent it from running down under its own weight. This arrangement is especially important when using a heavy condenser with a phase contrast device.

The two-lens condenser, with a numerical aperture of 1.2 is provided with iris diaphragm and a swing-out holder 16 for the light filter. The condenser operates on conjunction with the plane and concave mirror 17.

The fork-shaped mirror holder is reversible and allows either mirror surface to be directed toward the source of light and be properly positioned.

The upper front lens of the condenser may be removed. This decreases the numerical aperture to 0.5 and is necessary when working with low power objectives as, for instance, with an objective 8 \times .



The condenser aperture is equal to 1.2 only when oil-immersion is used between the front lens and the object glass. Without oil-immersion, the condenser aperture is approximately unity.

The upward movement of the condenser substage is limited by a stop so that in the extreme upper position, a clearance of about 0.1 mm remains between the condenser front lens and the cover glass.

By special order a dark ground condenser OII-13 may be supplied with the microscope. It can be inserted in the fitting instead of the standard type.

The object stage is fastened on a special bracket. The latter, in turn, is fastened to the housing 3. The upper part of the stage may be rotated by means of the knurled ferrule. Besides this, the stage may be adjusted 8 mm in the longitudinal and cross directions by means of two screws and a spring to bring any point of the specimen into the center of the field of view.

There are seven threaded holes on the top of the object stage. The four central holes serve for fastening the spring clips 18 for holding the specimen while the three holes at the sides are for fastening a superimposed mechanical stage, not included in the standard microscope set, but furnished on special order.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on top for carrying.

There are sliding holders in the case for storing objectives and eyepieces, as well as a box for microscope accessories.

SPECIFICATIONS

Range of total magnification	from 56 \times to 1350 \times		
Achromatic objectives:	8 \times	40 \times	90 \times
initial magnification	8 \times	40 \times	90 \times
numerical aperture	0.20	0.65	1.25
focal length, mm	18.2	4.35	1.96
working distance, mm	8.91	0.61	0.15
field of view with 10 \times eyepiece, mm	1.75	0.35	0.15
Huyghenian eyepieces:	7 \times	10 \times	15 \times
magnification	7 \times	10 \times	15 \times
focal length, mm	36	25	17
linear field of view, mm	18	14	8
Objective changer	quadruple revolving nosepiece		
Number of body tubes	two (straight and inclined monocular tubes)		
Focusing adjustments:			
coarse	by rack and pinion		
fine	micrometric mechanism, reading to 0.002 mm		
Illuminating system	reversible plane and concave mirror, two-lens condenser		
1.2 N.A. with iris diaphragm and interchangeable filter			
Object stage	circular with centring and rotating adjustments		
Overall dimensions of microscope (height \times length \times width), mm	285 \times 210 \times 190		
Overall dimensions of case, mm	365 \times 200 \times 245		
Weight of microscope, kg	4.6		
Weight of microscope in case, kg	9.5		

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb, inclined monocular body tube, coarse and fine focusing mechanisms, revolving nosepiece, circular rotary object stage and illuminating system

Achromatic objective, 8 \times \times 0.20, in case
 Achromatic objective, 40 \times \times 0.65, in case
 Achromatic objective, 90 \times \times 1.25 (oil-immersion), in case
 Huyghenian eyepiece, 7 \times
 Huyghenian eyepiece, 10 \times
 Huyghenian eyepiece, 15 \times
 1.2 N.A. Aplanatic condenser
 Straight tube
 Optal glass
 Blue filter
 Clips for holding specimens (2 pieces)
 Flannel napkin
 Squirrel-hair brush
 Wrenches (2 pieces)
 Case for microscope
 Vial with immersion, oil in case
 Box for microscope accessories
 Sliding holders for storing objectives and eyepieces
 Description and instruction manual
 Certificate



BIOLOGICAL RESEARCH MICROSCOPE, MODEL MBII-2

The MBII-2 Biological Microscope (Fig. 9) is an ideal instrument for detailed and comprehensive research work.

This microscope has found wide application in biological, bacteriological, biochemical, medical and other scientific research institutions.

The MBII-2 Microscope has an inclined eyepiece tube which allows the observer to work in a comfortable seated position.

The low position of the coarse and fine focusing mechanism is especially convenient during prolonged research work when it is necessary to focus on some layer of the specimen for a long time.

The corresponding position of the coarse and fine focusing heads allows the arms to rest on the table during microscopy and decreases the fatigue of the observer.

The main binocular tube, furnished with the microscope, provides for observation with both eyes. This decreases eye fatigue during prolonged observation by creating more natural working conditions. Besides this, the binocular tube provides for some stereoscopic relief which increases the research potentialities of the microscope.

The MBII-2 Microscope with a binocular tube produces an upright image of the object. An inclined monocular tube or a straight tube intended for photographic purposes may be substituted for the inclined binocular tube. All these tubes are interchangeable and may be attached without preliminary fitting operations.

The microscope has a highly perfected illuminating system mounted in the base of the instrument.

The condensers are arranged in a triple revolving substage device operating in conjunction with the pancreatic system. The pancreatic system allows the numerical aperture of the condenser to be varied from 0.16 to 1.4.

Changing condensers by means of the revolving substage device has considerable advantages over the usual method of changing condensers by inserting them into the spring fitting.

Microscopy may be carried out with transmitted light on either a bright or dark ground. The illuminating system provides sufficient light for dark ground operation or for microphotography.

The object stage of the microscope is always horizontal which is convenient for examining liquids.

This microscope is furnished with a set of high-quality apochromatic objectives and compensating eyepieces.

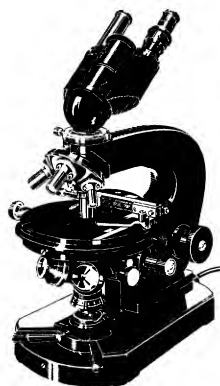


Fig. 9
MBII-2 Biological Research
Microscope

The optical system of the microscope (Fig. 10) comprises the light source — an electric lamp 1, lens 2, aperture unit consisting of prism 3, lens 4 and aperture iris diaphragm 5, pancreatic system 6, interchangeable condensers 7, objective 8, prism 9 and eyepiece 10.

The specimen 11 is placed between the object and cover glasses arranged between the condenser 7 and the objective 8.

The base 1 of the microscope (Fig. 11) has the form of a circle with cut-off segments.

The bracket-housing 2 is fastened to the base. On one side it has guides for the condenser substage bracket 3 and on the other side, guides for the limb 4.

The fine focusing mechanism is mounted inside the housing. It is actuated by rotating the heads 5 arranged on the right- and left-hand sides. On the right-hand

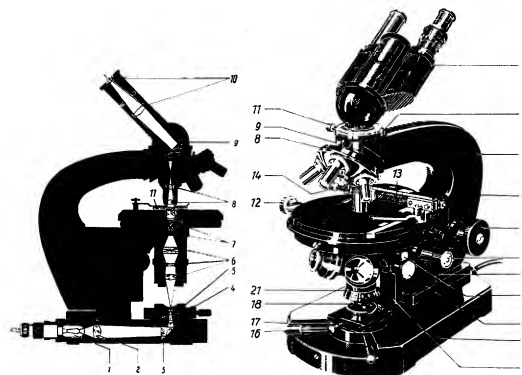


Fig. 10
Optical System of the MBII-2 Microscope

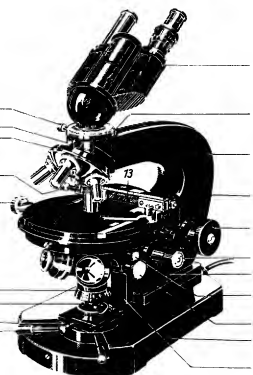


Fig. 11
Main parts of the MBII-2 Microscope

side a graduated drum with 50 divisions is mounted on the shaft of the heads. One revolution of the drum corresponds to a body adjustment of 0.1 mm. The drum is graduated 1 div. = 0.002 mm.

The total movement of the body from the fine focusing mechanism equals 2.3—2.5 mm and is determined by two scratches on the right-hand side of the housing. A reference mark on the movable part of the housing and two scratches on the stationary part correspond to the extreme positions of the body during adjustment. The fine focusing mechanism displaces the limb together with the coarse focusing mechanism.



The limb has the form of an arc. This allows large sized objects to be placed on the microscope stage and also facilitates carrying the microscope from place to place.

The coarse focusing mechanism, actuated by revolving the heads 6, is mounted in the lower part of the limb. The design of the coarse focusing mechanism allows the smoothness of the movement to be regulated to suit the observer. This mechanism provides a vertical body movement of 50 mm (two and one half turns of the heads).

The mounting 7, with dovetail guides, is fastened to the upper end of the limb.

The revolving nosepiece 8 is inserted into these guides and properly positioned by screw 9. The revolving nosepiece serves for holding and rapidly changing objectives. It has four threaded holes for inserting objectives arranged in a spherical dish. The rotation of the spherical dish is indexed in the four positions by a spring device arranged inside the nosepiece. The alignment accuracy is such that on changing to higher powers the specimen set in the center of the field of view, with the low power objective always remains in the field of view of the consequently replaced high power objective. When changing from one objective to another, the specimen always remains visible and only a small adjustment of the fine focusing head is necessary to obtain a sharp image.

The only exception, to the above, is the oil-immersion objective with a magnification of 90 \times . It has a working distance somewhat higher than for dry systems.

The standard set of the instrument includes four apochromatic objectives computed for a mechanical tube length of 160 mm and a cover glass thickness of 0.17 mm.

The oil-immersion objective, 60 \times \times 1.0, is furnished with an iris diaphragm for varying the objective aperture. This objective is used, chiefly, in conjunction with cardioid-condenser. The aperture of the objective is changed by rotating a knurled ring on the mount of the objective.

The initial magnification and the numerical aperture are engraved on the mount and on the bottom of the storage cases of each objective.

The mounting 7 has a socket on top for fastening the interchangeable body tubes. An annular tapered neck at the base of each tube enters the socket of the mounting.

The inclined monocular and binocular tubes 10 can be rotated about a vertical axis and fixed in any position by means of screw 11 on the right-hand side of the limb mounting.

The mechanical tube length of any of the MB11-2 Microscope body tubes equals 160 mm.

The length of the straight tube is variable and is adjusted by extending a draw-tube to a reading taken on the scale on the stationary section of the straight tube (Fig. 12).

Five types of compensating eyepieces are included in the standard microscope set. The eyepieces are designed so that after interchanging them, only a small adjustment of the fine focusing heads is required to obtain a sharp image. The type and magnification of the eyepieces are engraved on the mount of the eye lens.

By using suitable objectives and eyepieces furnished with the microscope total magnifications from 75 \times to 1350 \times can be obtained with the binocular body (including the initial magnification of the tube equal to 1.5 \times) and a magnification from 50 \times to 1350 \times with the monocular body tube.

The microscope is furnished with a rotary centring object stage having a mechanism for crosswise movement of the specimen. The stage is moved in a longitudinal

direction by rotating the screw 12 (Fig. 11). Cross movement is accomplished by aid of the mechanical stage 13, fastened to the movable part of the object stage. It is actuated by rotating the screw 14.

The amount of movement in either direction can be read on the scales and verniers to an accuracy of 0.1 mm. The upper part of the object stage can be rotated by releasing screw 15 on the left-hand side of the stage.

The illuminating system is mounted in a cylindrical recess inside the base 1. The lampholder and bulb are inserted and aligned in an eccentric bushing. The aperture unit is aligned by means of screws 16.

To obtain oblique illumination in any direction, the aperture diaphragm can be eccentrically positioned by means of screw 17.

The opening of the diaphragm is adjusted by means of the ring 18 which, at the same time, serves as a mount for the interchangeable light filters.

The pancreatic system and the revolving condenser substage are arranged on the bracket 3 and fastened by the screw 19. This bracket is raised and lowered by rotating the head 20.

The condensers are mounted in a detachable fixture fastened to the bracket.

The following condensers are held in the revolving substage device: aplanatic for apertures from 0.16 to 1.4, condenser for low power objectives and a cardioid-condenser for dark ground operation.

The value of the aperture set on the aplanatic condenser can be read on a scale engraved on ring 21 whose rotation changes the aperture.

The microscope is stored in a wooden case having the form of a cabinet with locking door and a handle on top for carrying.

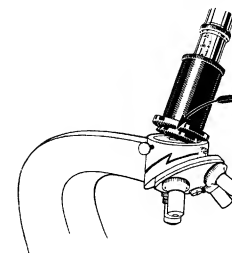


Fig. 12
The straight body tube and its installation in the limb mounting of the MB11-2 Microscope

SPECIFICATIONS

Range of total magnification:					
with binocular body	from 75 \times	to 1350 \times			
with monocular body tube	from 50 \times	to 1350 \times			
Apochromatic objectives:					
initial magnification	10 \times	20 \times	60 \times	90 \times	
numerical aperture	0.30	0.65	1.0	1.30	
focal length, mm	16.1	8.43	3.0	2.0	
working distance, mm	5.17	0.94	0.44	0.32	
field of view with 10 \times eyepiece, mm	1.3	0.65	0.22	0.15	
Compensating eyepieces:					
magnification	5 \times	7 \times	10 \times	15 \times	20 \times
focal length, mm	49.8	36	25.2	16.8	12.6
linear field of view, mm	23	18	13	12	9



Illuminating system	electric bulb 8V, 20W; aperture unit with iris diaphragm; panoramic system and three interchangeable condensers; aplanatic with variable aperture from 0.16 to 1.4, low power objective and cardioid-condenser
Objective changer	quadruple revolving nosepiece
Number of body tubes	two (straight monocular and inclined binocular)
Focusing adjustments:	
coarse	by rack and pinion
fine	micrometric mechanism, reading to 0.002 mm
Range of condenser substage adjustment, mm	20
Object stage	circular with centring and rotating adjustments, with crosswise movement, reading to 0.1 mm
Overall dimensions of microscope (height x length x width), mm	370 x 260 x 165
Overall dimensions of case, mm	400 x 235 x 280
Weight of microscope, kg	7.3
Weight of microscope in case, kg	13.7

MICROSCOPE SET

Microscope stand comprising a box-shaped foot containing the illuminating equipment, limb, coarse and fine focusing mechanisms, body tube mounting and crosswise type object stage, quadruple revolving nosepiece for objectives

Binocular attachment, type AY-12

Revolving substage with three condensers

Straight monocular body tube

Apochromatic objective, 10x x 0.30, in case

Apochromatic objective, 20x x 0.65, in case

Apochromatic objective 60x (1.0-0.7 oil-immersion) with iris diaphragm, in case

Apochromatic objective, 90x x 1.3 (oil-immersion), in case

Compensating eyepieces, 5x (2 pieces)

Compensating eyepieces, 7x (2 pieces)

Compensating eyepieces, 10x (2 pieces)

Compensating eyepieces, 15x

Compensating eyepiece, 20x

Opal glass

Green filter

Blue filter

Smoke-coloured filter

Lampholder with bulb and plug

Spare bulbs (8V, 20W - 2 pieces)

Transformer 127/220/8 V with rheostat

Set of wrenches and screwdrivers (4 pieces)

Protecting caps (2 pieces)

Vial with immersion oil, in case

Flannel napkin

Squirrel-hair brush

Case for microscope

Description and instruction manual

Certificate

TRAVELLING BIOLOGICAL MICROSCOPE, MODEL MEH-4

The MEH-4 Microscope (Fig. 13) is as up-to-date in design and is furnished with a similar set of objectives and eyepieces as the MEH-1 Microscope. It is, however, somewhat different in form and in the size of the stand.

The Travelling Microscope is designed for use in field and travelling conditions. It can be used for the examination of translucent objects with transmitted light on a bright or dark ground. By means of a normal incident illuminator, the microscope can be used for examining opaque objects with reflected light.

The Travelling Microscope is unsurpassed for research work in expeditions for botanists, zoologists, bacteriologists and other scientific workers.

This microscope has a small height and the coarse and fine focusing heads are arranged on the lower part of the microscope, so that the arms may be rested on the table during operation.

In the optical system (Fig. 14) of the microscope, a prism 3, changing the path of the rays to an angle of 45° to the horizontal plane is arranged between the objective 1 and the eyepiece 2. The prism 3 is designed so that the mechanical tube length remains 160 mm.

The base 4 of the instrument is a rectangular plate with three supporting pads and the screw 5 which serves to keep the microscope stable on an uneven surface.

The intermediate housing 6 is a rectangular parallelepiped screwed to the base.

Two sides of the housing 6 carry guides: on one side for the limb 7 and on the other side for the condenser substage bracket 8.

The fine focusing mechanism is mounted inside the housing. It is actuated by rotating the heads 9 arranged on the right- and left-hand side of the housing. A drum with a scale on the left-hand head allows the body to be adjusted with an accuracy of 0.002 mm.

Coarse focusing is provided by a rack and pinion actuated by rotating the heads 10.

The limb has an arched form and, on its upper end, carries the mounting 11 with dovetail guides for fastening the revolving nosepiece 12.

The revolving nosepiece for holding and rapidly changing objectives has three threaded holes for inserting objectives and a spring click device which assures proper centring of each of the objectives with the optical axis of the body.

The mounting 11 has a socket on top for inserting the inclined monocular tube 13.

The inclined tube may be rotated to any position about a vertical axis and can be fixed in the required position by the screw 14.

The condenser substage has a spring fitting for holding the condenser 15. This



Fig. 13
MEH-4 Travelling Biological
Microscope



substage, together with the inserted condenser, may be adjusted in height by means of the rack and pinion 16.

Three achromatic objectives and three Huyghenian eyepieces are furnished with the microscope. Magnifications achieved by the various combinations of objectives and eyepieces range from $56\times$ to $1350\times$.

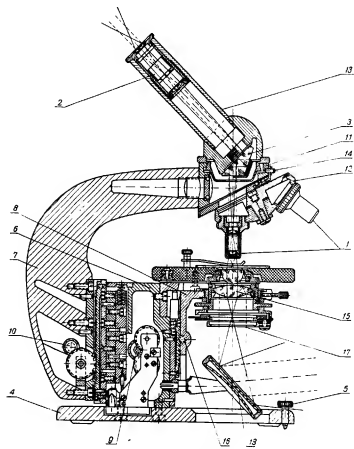


Fig. 14
Diagrammatical sectional view of the MBI-4 Microscope

A two-lens aplanatic condenser, with an aperture of 1.2, having an iris diaphragm and a swing-out mount for the light filter 17, is furnished with the microscope. The condenser operates in conjunction with the mirror 18.

The microscope with all the necessary accessories is stored in a convenient travelling case with a handle.

SPECIFICATIONS

Range of total magnification from $56\times$ to $1350\times$
Achromatic objectives $8\times \times 0.20$, $40\times \times 0.65$ and
..... $90\times \times 1.25$ (optical data same
as for Microscope MBI-1)

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Huyghenian eyepieces $7\times$, $10\times$ and $15\times$ (optical data same as for Microscope MBI-1)
Objective changer triple revolving nosepiece
Focusing adjustments:
coarse by rack and pinion
fine micrometric mechanism, reading to 0.002 mm
Illuminating system reversible mirror plane and concave; 1.2 N.A. two-lens condenser with iris diaphragm and interchangeable filter
Object stage rectangular
Overall dimensions of microscope (height \times length \times width), mm $280 \times 213 \times 92$
Overall dimensions of case, mm $268 \times 225 \times 115$
Weight of microscope, kg 3.6
Weight of microscope in case, kg 5.7

MICROSCOPE SET

Microscope stand comprising rectangular base, limb, revolving nosepiece, object stage and illuminating system

Inclined monocular tube
Achromatic objective, $8\times \times 0.20$, in case
Achromatic objective, $40\times \times 0.65$, in case
Achromatic objective, $90\times \times 1.25$ (oil-immersion), in case
Huyghenian eyepiece, $7\times$
Huyghenian eyepiece, $10\times$
Huyghenian eyepiece, $15\times$
1.2 N.A. aplanatic condenser
Opal glass
Blue filter
Clips for holding specimens (2 pieces)
Flannel napkin
Squirrel-hair brush
Wrenches (2 pieces)
Vial with immersion oil, in case
Travelling case
Description and instruction manual
Certificate

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ACCESSORIES FOR BIOLOGICAL MICROSCOPES

BINOCULAR ATTACHMENT, MODEL AS-12

When working with a microscope having a monocular tube, only one eye is used in observation. This differs from the natural conditions of using both eyes and sustained observation leads to eye fatigue.

The AS-12 Binocular Attachment (Fig. 15) allows the observer to use both eyes, providing more natural conditions and decreasing eye fatigue. Besides this, the resolving power of the microscope is increased by use of the Binocular Attachment.

The Binocular Attachment operates in the following manner:

After passing through the microscope objective, rays of light fall on the lens 1 (Fig. 16), which carries the image to the focal plane of the eyepieces.

The prism 2 diverts the passing rays and directs them, at an angle of 45° to the vertical, to the system of cemented prisms 3 comprising a rhombic and a triangular prism. The contact face of the rhombic prism is semi-chromium plated.

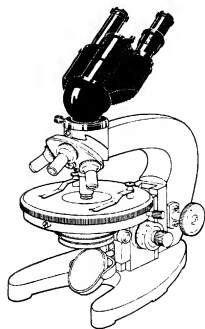


Fig. 15
The AS-12 Binocular Attachment

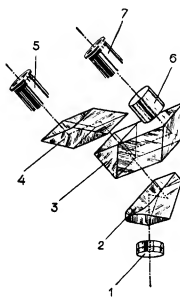


Fig. 16
Optical System of the AS-12
Binocular Attachment

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This semi-chromium plated cementing surface passes 50% of the light rays and directs them through prism 4 to the eyepiece 5. The reflected 50% of the rays pass through the rhombical part of the prisms 3 and are deviated through an angle of 90° through the compensator 6 and further to the second eyepiece 7 of the attachment.

The optical system of the Binocular Attachment is designed to provide an upright image of the object examined.

The interchangeable eyepieces are inserted into the eyepiece tubes 1 (Fig. 17) screwed into the right- and left-hand bodies 2.

The dioptic mechanism 3 on the left eyepiece tube is adjusted by rotating the knurled ring 4 having a scale.

The attachment has an interocular adjustment which allows the distance between the eyepieces to be regulated to suit the distance between the pupils of the observer. The required interocular distance is set to a scale on the flange of the eyepiece tube.

Due to the spherical fitting 5, the Binocular Attachment may be rotated to any position and inclined to any angle convenient for the observer.

The Binocular Attachment is stored in a special case containing holders for the eyepieces.

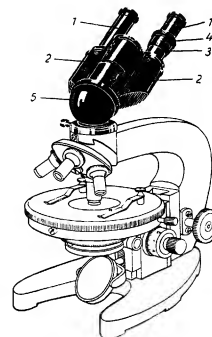


Fig. 17
Main parts of the AS-12
Binocular Attachment

SPECIFICATIONS

Initial magnification of attachment.....	1.5x
Magnification of Huyghenian eyepieces.....	7x and 10x
Dioptic adjustment of eyepiece, diopters.....	± 5
Range of interocular adjustment, mm.....	from 55 to 75
Overall dimensions of attachment, mm.....	$160 \times 120 \times 75$
Overall dimensions of case, mm.....	$230 \times 140 \times 90$
Weight of attachment, kg.....	0.76
Weight of attachment in case, kg.....	1.15

BINOCULAR ATTACHMENT SET

Huyghenian eyepieces 7x (2 pieces)
Huyghenian eyepieces 10x (2 pieces)
Caps (2 pieces)
Case
Description and instruction manual
Certificate

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UNIVERSAL PHOTOMICROGRAPHIC ATTACHMENT, MODEL MΦH-1

The MΦH-1 Photomicrographic Attachment (Fig. 18) serves in an universal manner for photographing objects through a microscope.

The attachment is designed to be supported by the microscope and may be attached to any instrument having an eyepiece tube of standard external diameter of 25 mm.

Either of two sizes of cameras may be furnished with the attachment in accordance with the Buyer's requirements. Type MΦK-1 (camera has a plate size of 6.5×9 cm while type MΦK-2 has a plate size of 9×12 cm.



Fig. 18
MΦH-1 Photomicrographic
Attachment

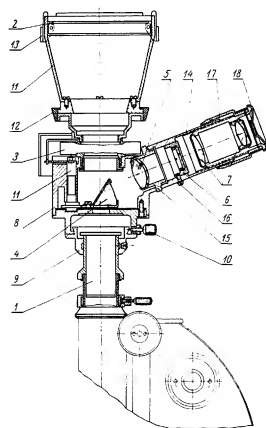


Fig. 19
Diagrammatical sectional view of the MΦH-1
Photomicrographic Attachment

The Photomicrographic Attachment operates in the following manner:

Rays of light, passing through the microscope eyepiece 1 (Fig. 19) either directly to the photographic plate 2, through the shutter 3, or if the prism 4 is inserted, are reflected at an angle of 70° to the microscope axis and are directed to the visual observation tube.

Objective 5, of the visual observation tube, focus the image of the object in the plane of the reticule 6, arranged in the focal plane of the eyepiece 7.

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The eyepiece reticule 6 is so positioned that a sharp image of the object appears simultaneously on both the reticule and the photographic plate.

The eyepiece 7 has a dioptric adjustment of ± 5 diopters which allows the eyepiece to be focused to obtain a sharp image on the reticule to suit the observer.

The body 8, of the attachment, has an adaptor 9 for fastening it to the eyepiece tube 1. It is fixed by the screw 10.

The swing-out prism 4 is mounted in the body 8 and is interlocked by a lever with the control mechanism of the shutter 3. When the cable release button is depressed, the prism 4 is automatically swung aside out of the path of the rays. At the end of the exposure, the prism returns to its initial position.

The shutter provides for two exposures: "bulb"—"K" and "snap-shot"—"M". The "snap-shot" exposure is obtained by pressing the cable button and does not depend on the length of time the button is held depressed. When arranged for "bulb" exposure, the shutter remains open as long as the button is depressed.

After the shutter has operated and the button is released, the prism returns to its initial position and directs the rays of light to the visual observation tube.

The camera 11 is connected to the body 8 and may be easily removed after unscrewing the threaded ring 12.

The plate holder 13 with the photographic plate is inserted into the camera.

To make cameras, types MΦK-1 and MΦK-2, fully interchangeable and to eliminate adjustment when changing from one camera to the other, a lens is arranged in the lower flange of the MΦK-2 camera to compensate for the difference in length of the cameras.

The objective mounting 15, reticule mounting 16 and eyepiece mounting 17 are arranged inside the tubular body 14 of the visual observation tube.

The dioptric graduations are engraved on the external tube of the eyepiece mounting. A smoke-colored light filter 18 is placed on the eyepiece to protect the eye from the intense light necessary during photography.

SPECIFICATIONS

Plate size of camera, cm:		
MΦK-1	6.5 × 9	
MΦK-2	9 × 12	
Coefficient of magnification of photograph:		
MΦK-1	0.5	
MΦK-2	1	
Overall dimensions of attachment, mm:	with camera MΦK-1	153 × 155 × 126
	with camera MΦK-2	224 × 155 × 148
Overall dimensions of case, mm:	with camera MΦK-1	234 × 173 × 108
	with camera MΦK-2	268 × 185 × 126
Weight of attachment, kg:	with camera MΦK-1	0.55
	with camera MΦK-2	0.70
Weight of attachment in case, kg:	with camera MΦK-1	1.3
	with camera MΦK-2	1.7

PHOTOMICROGRAPHIC ATTACHMENT SET

Camera MΦK-1 or MΦK-2
 Plateholders 6.5×9 or 9×12 (3 pieces either)
 Light filter in mounting
 Cable release
 Case for attachment
 Description and instruction manual
 Certificate

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MICROMETER EYEPIECE, MODEL AM-9-2

The AM-9-2 Micrometer Eyepiece (Fig. 20) is an eyepiece with a fixed and a movable reticule in its field of view.

The Micrometer Eyepiece is designed for accurate measurement of objects being studied under the microscope.

The instrument can be used on all models of biological microscopes to replace the standard eyepiece.

The body 1 (Fig. 21) of the Micrometer Eyepiece has a fitting 2 by means of which it is fastened on the microscope tube with the aid of screw 3.

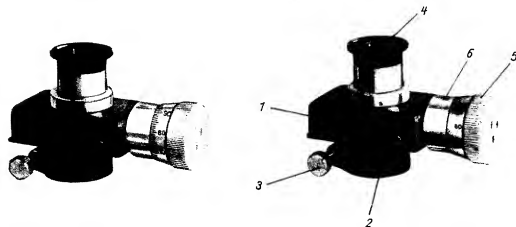


Fig. 20
AM-9-2 Micrometer Eyepiece

Fig. 21
Main parts of the AM-9-2 Micrometer Eyepiece

The compensating eyepiece 4, containing the stationary reticule, is inserted into the upper part of the body. The reticule has a millimeter scale 8 mm in length. The eyepiece has a dioptric adjustment to allow the scale images to be properly focused.

The graduated drum 5, connected with the tube 6, has a circular uniform scale graduated to 100 divisions. A line engraved on the tube serves as a reference for drum readings.

One revolution of the drum displaces the movable reticule 1 mm. A rotation through one division of the drum corresponds to a displacement of 0.01 mm.

The Micrometer Eyepiece is stored in a polished wooden case.

SPECIFICATIONS

Eyepiece magnification	15×
Total movement of reticule, mm	8
Value of drum scale divisions, mm	0.01
Overall dimensions of instrument	
(length × width × height), mm	84 × 42 × 58
Overall dimensions of case, mm	120 × 90 × 48
Weight of instrument, kg	0.21
Weight of instrument in case, kg	0.38

MICROMETER EYEPIECE SET

Case
Description and instruction manual
Certificate

DRAWING APPARATUS, MODEL PA-4

The PA-4 Drawing Apparatus (Fig. 22) is used for tracing the outlines of objects examined under a microscope, as well as for checking the magnification provided by the optical system of a microscope.

This apparatus is applicable to all biological microscopes constructed on the basis of the M-10 microscope, as well as to the MB11-1 and MB11-2 microscopes when using a straight monocular body.

The main part of the instrument is the prism-cube 1 (Fig. 23). It comprises two rectangular prisms cemented together on their hypotenuse faces. The hypotenuse face of one prism is semi-silvered.

This face of the prism-cube directs rays of light from the drawing paper 2, reflected by the mirror 3, to the observer's eye. It also passes approximately 50% of the light from the object.

In this way the observer simultaneously sees both the object and the paper and pencil located 250 mm from the eye.

To even the backgrounds, and consequently, to provide better visibility of both the specimen and the paper and pencil, two systems with neutral and blue light filter 4 are furnished in the instrument.

The prism-cube is mounted in a swing-back fitting which carries the sector and the drum with light filters. Both the sector and the drum have four openings. One opening is free, two have neutral filters of different density while the fourth opening carries a blue filter.

The fitting has an opening on the side facing the mirror through which rays pass from the paper to the prism-cube.

The mirror mount is fastened to a bar whose other end is fixed in a hole in an upright member. The latter is rigidly fastened to the fitting by means of which the apparatus is attached to the microscope eyepiece tube.

The Drawing Apparatus is stored in a wooden case.

SPECIFICATIONS

Overall dimensions of the instrument	215 × 90 × 40
(length × width × height), mm	240 × 120 × 55
Overall dimensions of case, mm	0.23
Weight of instrument, kg	0.64
Weight of instrument in case, kg	

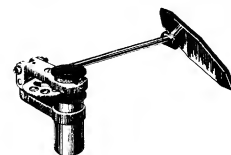


Fig. 22
PA-4 Drawing Apparatus

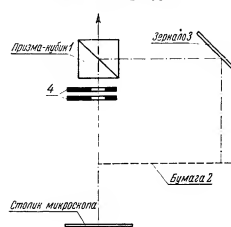


Fig. 23
Optical System of the PA-4 Drawing Apparatus



PHASE-CONTRAST EQUIPMENT, MODEL KΦ-1

As a rule, microscopy is concerned with low contrast specimens which must be stained before observation under the microscope. Living specimens usually perish after staining.

The simplest method of increasing the contrast by diaphragming the aperture diaphragm of the condenser, decreases the revolving power and the illumination without increasing the contrast in any considerable degree.

Dark ground observation provides good contrast but it is reversed. Light parts of the specimen are shown dark and vice versa. This method, besides, only allows the outline of the specimen to be determined without revealing its internal structure.

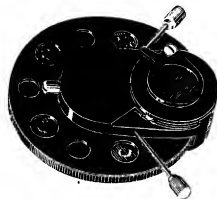


Fig. 24
KΦ-1 Phase-Contrast Equipment

The most perfected method of research is observation by means of the phase-contrast method. This method provides for observation of unstained noncontrasting specimens. A contrasting image is obtained in which the lighter or darker portions correspond to various thickness or optical densities of the specimen.

In this way, the phase-contrast method opens wide possibilities for research on living unstained specimens and finds extensive application in bacteriology, biology, medicine and other branches of science.

The equipment for the phase-contrast method of observation can be used on the biological microscopes, models M-10, MBII-1 and MBII-4.

The KΦ-1 Equipment (Fig. 24) comprises the following main parts:

1. Objectives for phase-contrast observation.
2. Phase-contrast condenser.
3. Auxiliary microscope.

The objectives in the equipment differ from usual achromatic objectives only in that a phase plate has been placed in the plane of the exit lens. This phase plate changes the phase of the zero maximum by 90° and decreases its intensity.

Besides the usually engraved figures indicating the initial magnification and the aperture, these objectives have the letter "Φ" engraved on the mount and case indicating that they are of the phase type.

The condenser included in the equipment does not differ from the usual 1.2 N. A. condenser except that it has a revolving disc with annular diaphragms arranged in its focal plane.

Each objective requires its annular diaphragm. Numbers appear in an opening of the revolving disc which indicate the objective that should be used in conjunction with the indexed annular diaphragm.

For observation in the usual manner, the condenser is provided with an iris diaphragm and the revolving disc with a free opening for passing light rays. The condenser is inserted into the microscope condenser holder and is fastened by a screw in the usual manner.

The auxiliary microscope included in the equipment serves for checking the centring of the annular diaphragm in reference to the phase plate of the objective. The auxiliary microscope is inserted into the microscope tube instead of the eyepiece and after centring is completed, it is replaced by the usual eyepiece. The microscope comprises a fitting in which the objective is mounted and into which the eyepiece is inserted. The latter can be adjusted in the fitting and fixed in the required position by a screw.

The equipment is stored in a wooden case.

SPECIFICATIONS

Objectives	special with phase plate —10× × 0.30; 20× × 0.40; 40× × 0.65 and 90× × 1.25
Condenser	aperture 1.2; with iris diaphragm and revolving disc holding four annular diaphragms
Magnification of auxiliary microscope	20×
Overall dimensions of equipment, mm	120 × 130 × 60
Overall dimensions of case, mm	220 × 150 × 80
Weight of equipment, kg	0.51
Weight of equipment in case, kg	1.68

PHASE-CONTRAST EQUIPMENT SET

Objective 10× × 0.3
Objective 20× × 0.4
Objective 40× × 0.65
Objective 90× × 1.25
1.2 N.A. condenser, with revolving disc
Auxiliary microscope
Case
Description and instruction manual
Certificate



MECHANICAL STAGE, MODEL CT-12

The CT-12 Mechanical Stage (Fig. 25) has been designed for smooth movement of the specimen on the object stage of the microscope in two directions at right angles to each other.

The CT-12 Mechanical Stage is an attachment which can be fitted to any biological microscope.

The frame 1 of the stage (Fig. 26) has guides 2 along which slides, with clips 3 and 4, can be moved. The slides with clips can be fixed by the clamping screws 5 to suit the length of the object glass.

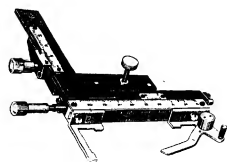


Fig. 25
CT-12 Mechanical Stage

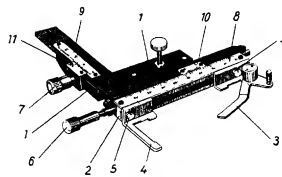


Fig. 26
Main parts of the CT-12 Mechanical Stage

The specimen is shifted in a transverse direction by the head 6 and in the longitudinal direction by the head 7.

The scales 8 and 9 for the transverse and longitudinal movements are read by means of the verniers 10 and 11 fastened to the movable parts of the stage.

The Mechanical Stage is stored in a wooden case.

SPECIFICATIONS

Transverse movement scale range, mm	from 50 to 135
Longitudinal movement scale range, mm	from 0 to 35
Reading accuracy, mm	0.1
Overall dimensions of instrument	
(length × width × height), mm	150 × 135 × 30
Overall dimensions of case, mm	172 × 130 × 40
Weight of instrument, kg	0.278
Weight of instrument in case, kg	0.550

MECHANICAL STAGE SET

Centring plate
Stud
Case
Description and instruction manual
Certificate

NORMAL INCIDENT ILLUMINATOR, MODEL OH-1

The OH-1 Normal Incident Illuminator is designed for the intensive illumination of opaque or semi-transparent objects seen under biological microscopes.

With the Normal Incident Illuminator (Fig. 27) the object is illuminated through the microscope objective. Consequently the specimen is seen on a bright background, that is, the portions of the specimen which reflect less light are seen as dark spots or bands in accordance to their form.

When using the illuminator it is necessary to use objectives in short mountings computed for a mechanical tube length of 190 mm and corrected for a specimen without cover-glass.



Fig. 27
OH-1 Normal Incident Illuminator

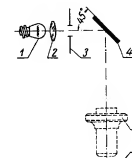


Fig. 28
Principle of operation of the OH-1 Illuminator

The Normal Incident illuminator is applicable on the M-10 Microscopes and all other models constructed on its basis.

When using the illuminator the draw tube of the M-10 Microscope should be set at the 160 mm division as the 30 mm length of the illuminator body supplements to the computed mechanical tube length of 190 mm.

Fig. 28 indicates the principle of operation of the Normal Incident Illuminator.

The source of light is an electric bulb 1, supplied a. c. mains through a step-down transformer.

The rays of light pass through lens 2 and diaphragm 3 and fall on the thin glass plate 4, arranged between the objective 5 and the microscope eyepiece not shown on the diagram.

The glass plate is positioned at an angle of 45° to both the direction of the rays and to the optical axis of the microscope.

Part of the light passes through the plate while the other part is reflected through the objective 5 and concentrated by the latter on the observed surface of the specimen 6.

On being reflected from the surface, the rays again pass through the objective and falling on the plate 4 are again diverged. A part is reflected back to the illuminator while the rest, after passing through the plate, is directed through the eyepiece to the eye of the observer.

The cylindrical body 1 of the illuminator (Fig. 29) connects the microscope objective, which is screwed into the socket 2, with the microscope body which is screwed on the threaded ring 3.



The socket 5 with bulb is inserted into one end of the tube 4 while an iris diaphragm is mounted inside the other end. Rotating the handle 6 changes the opening from 0.5 mm to 7.5 mm and in this way varies the brightness of illumination of the object.

Rotating the head 7 revolves the glass plate through an angle of 45° to the axis of the body 1. This allows the plate to be adjusted to the most advantageous position for illuminating the object.

The necessary friction to prevent accidental rotation of the plate is provided by two spring washers.

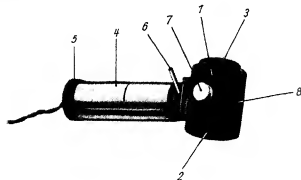


Fig. 29
Main parts of the OI-1 Normal Incident Illuminator

The illuminator body has a port 8 on the side opposite to the illuminating tube. It serves to pass the light from the lamp, that passes through the glass plate. This is necessary to eliminate a glare that interferes with observation.

The Normal Incident Illuminator is stored in a special wooden case.

SPECIFICATIONS

Source of illumination	electric bulb 3.5 V, 0.16 A
Range of diameter variation of iris diaphragm, mm	from 0.5 to 7.5
Overall dimensions of instrument, mm	90 × 35 × 33
Overall dimensions of case, mm	120 × 90 × 48
Weight of instrument, kg	0.12
Weight of instrument in case, kg	0.285

ILLUMINATOR SET

Pin (wrench)
Case
Description and instruction manual
Certificate

DARK GROUND CONDENSER, MODEL OI-13

When examining weakly contrasting objects under the microscope, conditions are often met with in which observation on a bright ground, with the usual type of condenser, is impossible as the image of the object is invisible.

To increase the contrast of the image in reference to the general background of the microscope field of view, so-called dark ground illumination is used. This provides the possibility of revealing details of the object that were invisible before.

This type of illumination can be provided by means of the Dark Ground Condenser, Model OI-13 (Fig. 30).

The Dark Ground Condenser is applicable to all models of biological microscopes except MV and MHC-7.

Increasing the resolving power of the microscope by the aid of the Dark Ground Condenser is based on the diffraction of light and on obtaining a light contrast of an illuminated object on a dark background.

This effect is achieved by means of the illumination created by the Dark Ground Condenser much in the same way as particles of dust, invisible in the air under usual conditions, become distinctly visible in a dark room in rays of sunlight.

The optical system of the condenser is shown in Fig. 31.

A parallel pencil of light, from the microscope mirror, passes through the plane-concave lens 1, the plane-parallel plate 2 having a spherical recess internally silvered, the cardioid lens 3 and exits in an oblique direction.

In this way the object receives oblique illumination in an absolutely dark background as the direct rays, due to the spherical recess in the plate 2, do not reach the objective of the microscope.

The Dark Ground Condenser comprises the external ring 1 (Fig. 32) into which are mounted the internal ring with a cylinder 2 and the sleeve 3 containing the optical equipment 4.

Rotating the two screws 5 displaces the cylinder with the optical system in a plane perpendicular to the optical axis of the microscope. The screws are rotated with the aid of a special wrench 6.

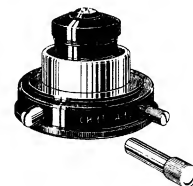


Fig. 30
OI-13 Dark Ground Condenser

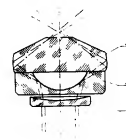


Fig. 31
Optical System of the OI-13 Dark Ground Condenser

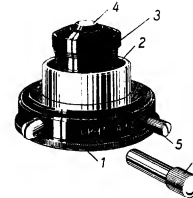


Fig. 32
Main parts of the OI-13 Dark Ground Condenser



The Dark Ground Condenser can be used with either oil-immersion objectives or with dry system objectives. The dark ground is less satisfactory in the second case.

When working with the Dark Ground Condenser it is advisable to use a cover-glass from 0.8 to 1.2 in thickness.

The condenser is furnished in a special wooden case.

SPECIFICATIONS

Numerical aperture	1.2
Overall dimensions of condenser (diameter \times height), mm	58 \times 36
Overall dimensions of case, mm	70 \times 70 \times 40
Weight of condenser, kg	0.19
Weight of condenser in case, kg	0.48

CONDENSER SET

Diaphragm for objective 90 \times \times 1.25
Wrenches for adjustment (2 pieces)
Case
Description and instruction manual
Certificate

MICROSCOPY LAMP, MODEL OI-7

The OI-7 Microscopy Lamp (Fig. 33) is designed for illuminating the specimen.

The lamp comprises a two-lens condenser with an iris diaphragm and a clamping device by means of which the lamp body is fastened to the vertical stand at the required height.

The source of light is a special electric bulb, 8V, 20W, supplied from an a. c. mains through step-down transformer 127 220 8V.

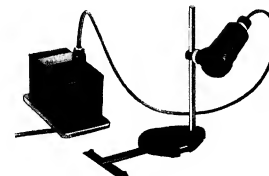


Fig. 33
OI-7 Microscopy Lamp

SPECIFICATIONS

Overall dimensions of instrument (length \times width \times height), mm	250 \times 240 \times 110
Overall dimensions of case, mm	310 \times 200 \times 150
Weight of lamp, kg	1.37
Weight of lamp in case, kg	4.6

MICROSCOPY LAMP SET

Lamp on stand
Connecting strip
Transformer
Electric bulbs, 8V, 20W (2 pieces)
Case for lamp
Description and instruction manual
Certificate



POLARIZING MICROSCOPES

POLARIZING MICROSCOPE, MODEL MHH-4

The MHH-4 Polarizing Microscope (Fig. 34) has wide applications in mineralogy, petrography and mineralography. It can also be used in chemistry and biology. This instrument is a large-size up-to-date polarizing microscope and its design features fully satisfy all requirements made to this class of microscopes.



Fig. 34
MHH-4 Polarizing Microscope

This microscope is designed for the inspection of translucent specimens in transmitted (ordinary and polarized) light with either conoscopic or orthoscopic optical systems.

Besides its usual applications, the design of the microscope provides for the examination of minerals by Prof. Fyodorov's method with reflected ordinary and polarizing light, as well as for the photography of specimens by means of the MDM-1 photomicrographic attachment.

The Polarizing Microscope, in addition to the usual optical system of objective, eyepiece and illuminating system, has prisms for polarizing light and for analysing the polarized light. The microscope has an additional lens for conoscopic operation.

Fig. 35 illustrates the optical system of the microscope.

From the source of light 1, the rays pass through the condenser 2 to the mirror 3 and are reflected to the polarizer 4.

After passing through the diaphragm 5, the polarizing light enters one of three interchangeable condensers 6. Further on the rays pass through the lens 7 and the specimen 8 into the objective 9 and analyzer 10. They then pass either directly to the eyepiece 11 (for orthoscopic operation) or first through a Bertrand type lens, not shown on the diagram

(for conoscopic operation).

To prevent the analyzer 10 from distorting the image, it is located between the lenses 12 creating a parallel pencil of rays.

A quartz plate 13 may be inserted between the objective and the analyzer. It compensates for the variation in the travel of the rays caused when the light passes through the examined specimen.

40

The microscope has the following constructive features:

The base 1 of the stand (Fig. 36) has a horse-shoe form with a boss having two lugs. The limb 2 is pivoted between the lugs. The limb is designed so that the object stage can accommodate the Fyodorov stage or other attachments that can be rotated through 360°. At the same time, the limb serves for carrying the instrument from place to place.

Coarse focusing adjustment is effected by a rack and pinion arranged in the upper part of the limb. They are operated by rotating the head 4.

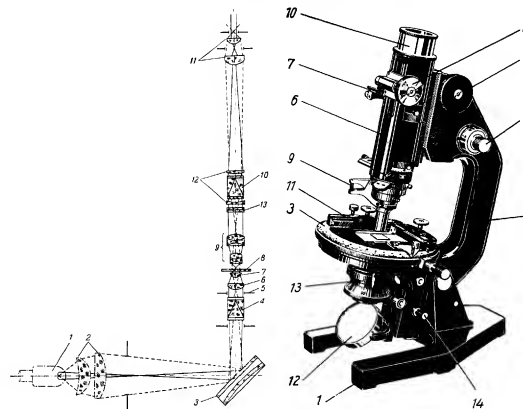


Fig. 35
Optical System of the MHH-4 Microscope

Fig. 36
Main parts of the MHH-4 Microscope

The head 5 for fine focusing adjustment is located somewhat lower. The head has a graduated drum on which readings can be made to an accuracy of 0.002 mm.

The body 6 has a slot in the upper part for the Bertrand type lens mechanism. It has a handle 7 for controlling the variable diameter diaphragm and a head 8 for displacing the lens along the optical axis of the microscope.

The lower end of the tube has dovetail guides for the mechanism with the analyzer prism mount. This mechanism provides for rotating the analyzer to the required angle read on a special scale, for inserting the quartz compensating plate and for including or excluding the analyzer in the optical system of the microscope.

The clamping device 9 serves to hold the objectives.

A drawtube 10 is screwed into the upper end of the body to accommodate interchangeable eyepieces or for fastening the photomicrographic camera.

41



A large set of special objectives, computed for operation in polarized light, and eyepieces are included in the instrument set. Part of the eyepieces are furnished with reticule or cross hairs for reading purposes.

The microscope object stage is of the circular rotary type. The working part of the stage is furnished with a circular scale graduated to 360° in 1° divisions. The angle of rotation of the object stage is read on a vernier with a reading accuracy of 6 minutes. The object stage has two holes for mounting standard spring clips, three holes for attaching the Fyodorov stage and three holes for fastening the mechanical stage 11 included in the microscope set.

The illuminating system of the microscope comprises the mirror 12 fastened in a fork-shaped bracket, the interchangeable condenser 13 and the polarizer.

The condenser together with the polarizer, can be adjusted vertically by means of the head 14.

The Polarizing Microscope is stored in a wooden case.

SPECIFICATIONS

Range of total magnification	from 1.85 \times to 1350 \times
Achromatic objectives:	3.7 \times 8 \times 20 \times 60 \times 90 \times
initial magnification	3.7 \times 8 \times 20 \times 60 \times 90 \times
numerical aperture	0.11 0.20 0.40 0.85 1.25
focal length, mm	33.1 18.2 8.4 2.99 1.96
working distance, mm	27.7 0.19 1.8 0.41 0.32
field of view with 5 \times eyepiece, mm	6.24 2.85 1.15 0.38 0.25
Wide-angle Huyghenian eyepieces:	With reticule and scale 1.5 \times With cross hair 1.8 \times
magnification	5 \times 8 \times
focal length, mm	50.6 31.4
linear field of view, mm	23 21
Photographic eyepiece, 10 \times :	
magnification	10 \times
focal length, mm	25
linear field of view, mm	13.4
Symmetrical eyepiece, 15 \times :	
magnification	15 \times
focal length, mm	17
linear field of view, mm	12
Objective changing mechanism	clamping device
Illuminating system	reversible mirror, plane and concave; interchangeable condensers with 1.27; 0.94 and 0.22 N.A.; polarizer; interchangeable opal glass
Focusing adjustments:	
coarse	by rack and pinion
fine	micrometric mechanism, reading to 0.002 mm
Object stage	circular, with rotary movement and with attached mechanical stage
Range of condenser substage adjustment, mm	20
Angle of polarizer rotation	360°
Rotation angle reading accuracy	2.5°
Angle of analyser rotation	90°
Rotation angle reading accuracy	2.5°
Eyepiece scale reading, mm	0.1

Value of reticule squares, mm	0.5 \times 0.5
Angle of rotation of object stage	360°
Object stage scale reading	1°
Overall dimensions of microscope (height \times length \times width), mm	350 \times 250 \times 135
Overall dimensions of case, mm	400 \times 250 \times 280
Weight of microscope, kg	5.9
Weight of microscope in case, kg	12.8

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb with coarse and fine focusing mechanisms, illuminating system and rotary object stage

Achromatic objective, 3.7 \times \times 0.11
 Achromatic objective, 8 \times \times 0.20
 Achromatic objective, 20 \times \times 0.40
 Achromatic objective, 60 \times \times 0.85
 Achromatic objective, 90 \times \times 1.25
 Wide angle Huyghenian eyepiece, 5 \times
 Wide angle Huyghenian eyepiece, 8 \times
 Photographic eyepiece, 6.5 \times
 Photographic eyepiece, 10 \times
 Symmetrical eyepiece, 15 \times
 Stage micrometer, for transmitted light, in case
 Quartz compensating wedge in mount
 Quartz compensating plate in mount
 1.27 N.A. interchangeable condenser
 0.94 N.A. interchangeable condenser
 0.22 N.A. interchangeable condenser
 Opal glass in mount
 Mechanical stage in case
 Fitting for MΦH-1 photomicrographic attachment
 Adapter for standard eyepieces
 Superimposed diaphragm for conoscopic operation
 Wrench for clamping device
 Combination wrench
 Watchmaker's screwdriver
 Squirrel-hair brush
 Flannel napkin
 Cover
 Case for microscope
 Case for objectives
 Case for eyepieces and accessories
 Description and instruction manual
 Certificate



PETROLOGICAL MICROSCOPE, MODEL MHH-5

The MHH-5 Petrological Microscope (Fig. 37) is designed for all types of petrological work, as well as for educational purposes.

This microscope has the same specifications as the MHH-4 Microscope, except that the polarizer and analyzer are manufactured of high-quality polyvinyl polaroid plastics, and the included set of objectives and eyepieces provide for magnification from 18.5 \times to 600 \times .

The microscope and its accessories are stored in a wooden case.



Fig. 37
MHH-5 Petrological Microscope

SPECIFICATIONS

Range of total magnification	from 18.5 \times to 600 \times			
Achromatic objectives:	3.7 \times	8 \times	20 \times	60 \times
initial magnification	3.7 \times	8 \times	20 \times	60 \times
numerical aperture	0.11	0.20	0.40	0.85
focal length, mm	33.1	18.2	8.4	2.99
working distance, mm	27.7	9.19	1.8	0.41
field of view with 5 \times eyepiece, mm	6.24	2.85	1.15	0.38
Wide-angle Huyghenian eyepieces:	With reticule and scale 1-5 \times With cross hair 1-8 \times			
magnification	5 \times 8 \times			
focal length, mm	50.6 31.4			
linear field of view, mm	23 21			

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Photographic eyepiece, 10 \times :	10 \times
magnification	25
focal length, mm	13.4
linear field of view, mm	13.4
Objective changing mechanism	clamping device
Illuminating system	reversible mirror plane and concave; interchangeable condensers with 1.27, 0.94 and 0.22 N.A.; polarizer; interchangeable opal glass
Focusing adjustments:	
coarse	by rack and pinion
fine	micrometric mechanism, reading to 0.002 mm
Object stage	circular with rotary movement
Overall dimensions of microscope (height \times length \times width), mm	350 \times 250 \times 155
Overall dimensions of case, mm	400 \times 259 \times 280
Weight of microscope, kg	6.0
Weight of microscope in case, kg	12.6

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb with coarse and fine focusing mechanisms, illuminating system and rotary object stage

Achromatic objective, 3.7 \times \times 0.11
 Achromatic objective, 8 \times \times 0.20
 Achromatic objective, 20 \times \times 0.40
 Achromatic objective, 60 \times \times 0.85
 Wide-angle Huyghenian eyepiece, 5 \times
 Wide-angle Huyghenian eyepiece, 8 \times
 Photographic eyepiece, 10 \times
 Stage micrometer for transmitted light, in case
 Quartz compensating wedge in mount
 Interchangeable condenser, 1.27 N.A.
 Interchangeable condenser, 0.94 N.A.
 Interchangeable condenser, 0.22 N.A.
 Opal glass in mount
 Fitting for M4H-1 photomicrographic attachment
 Adapter for standard eyepieces
 Superimposed diaphragm for conoscopic operation
 Wrench for clamping device
 Combination wrench
 Watchmaker's screwdriver
 Squirrel-hair brush
 Flannel napkin
 Cover
 Case for microscope
 Case for objectives
 Case for eyepieces and accessories
 Description and instruction manual
 Certificate

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ORE MICROSCOPE, MODEL MHH-6

The MHH-6 Ore Microscope (Fig. 38) is designed for exact examination of opaque objects in ordinary and polarized light at magnifications from 42 \times to 756 \times .

Besides its usual applications, the design of the microscope provides for the examination of translucent specimens in transmitted (ordinary or polarized) light, as well as for photography by means of the MΦH-1 photomicrographic attachment.

This microscope is used for all types of mineralographic research. Fig. 39 illustrates the main parts of the Ore Microscope.

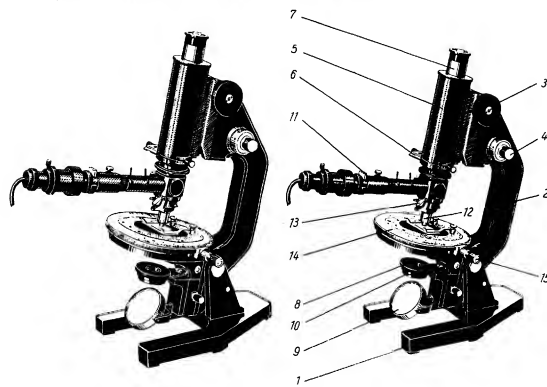


Fig. 38
MHH-6 Ore Microscope

Fig. 39
Main Parts of the MHH-6 Ore Microscope

The microscope stand comprises the base 1, limb 2 with head 3 for coarse focusing and drum 4 for fine micrometric focusing adjustment.

The microscope body 5 is of tubular form with a dovetail recess at its lower end. Into this recess is inserted the slide 6 with the polyvinyl polaroid plastics analyzer.

Transverse movement of the slide brings the analyzer in or out of the microscope optical system.

The eyepiece tube 7 is screwed into the upper end of the body. It is designed to accommodate standard eyepieces or a photomicrographic attachment, model MΦH-1.

The illuminating system of the microscope comprises the polyvinyl polaroid plastics polarizer in a mount 8, which can rotate through an angle of 360°, and the reversible plane and concave mirror 9.

The polarizer mount is fastened to the swing-out bracket 10.

The instrument includes the vertical polarized light illuminator 11, designed for the intensive illumination of the field of view of the examined surface of opaque and semi-transparent objects.

When using the vertical illuminator, the object is illuminated through the objective 12 which is inserted into the body by means of the clamping device 13.

The microscope is furnished with a rotary object stage 14 having a braking device 15.

The microscope is stored in a wooden case.

SPECIFICATIONS

Range of total magnification	from 42 \times to 756 \times				
Achromatic objectives:	4.2 \times	6 \times	10 \times	23.5 \times	35.3 \times 50.4 \times
initial magnification with additional lens, focal length - 141 mm	4.2 \times	6 \times	10 \times	23.5 \times	35.3 \times 50.4 \times
numerical aperture	0.12	0.17	0.30	0.65	0.75 1.25
focal length, mm	33.1	23.17	13.89	5.99	4.0 2.77
working distance, mm	18.9	6.2	5.71	0.96	0.32 0.44
field of view with 7 \times eyepiece, mm	4.2	3.0	1.8	0.75	0.36 0.52
Eyepieces:	Huyghenian	Huyghenian	Symmetrical	Compensating	
focal length, mm	7 \times	10 \times	15 \times	15 \times	
linear field of view, mm	36	25	17	16.8	
Objective changing mechanism	clamping device				
Illuminating system	reversible mirror, plane and concave; polarizer				
Focusing adjustments:					
coarse	by rack and pinion				
fine	micrometric mechanism, reading to 0.002 mm				
Object stage	circular with rotary movement				
Range of object stage rotation	360°				
Object stage scale reading	1°				
Overall dimensions of microscope (height \times length \times width), mm	350 \times 250 \times 155				
Overall dimensions of case, mm	400 \times 250 \times 280				
Weight of microscope, kg	5.0				
Weight of microscope in case, kg	14.2				

MICROSCOPE SET

Microscope stand comprising horse-shoe base, limb with coarse and fine focusing mechanisms, illuminating system, rotary, circular object stage and vertical illuminator

Achromatic objective 6 \times \times 0.17
 Achromatic objective 10 \times \times 0.30
 Achromatic objective 4.2 \times \times 0.12
 Achromatic objective 50.4 \times \times 1.25
 Achromatic objective 35.3 \times \times 0.75
 Achromatic objective 23.5 \times \times 0.65
 Huyghenian eyepiece 7 \times with reticle and scale
 Huyghenian eyepiece 10 \times
 Symmetrical eyepiece 15 \times
 Compensating eyepiece 15 \times



Stage micrometer for transmitted light
Blue filter
Transformer 127/220/8 V
Electric bulbs 8 V, 8.5 W (3 pieces)
Hand press
Wrench for removing clamping device
Wrenches for adjusting objective holder (2 pieces)
Vial with immersion oil
Combination wrench
Watchmaker's screwdriver
Flannel napkin
Squirrel-hair brush
Case for microscope
Case for objectives
Case for eyepieces
Description and instruction manual
Certificate

METALLOGRAPHIC MICROSCOPES

HORIZONTAL METALLOGRAPHIC MICROSCOPE, MODEL MIM-8

The MIM-8 Horizontal Metallographic Microscope (Fig. 40) provides for comprehensive research in the microstructure of metals and has a total effective magnification up to 1300 \times (for visual observation) and up to 3000 \times (for photography).

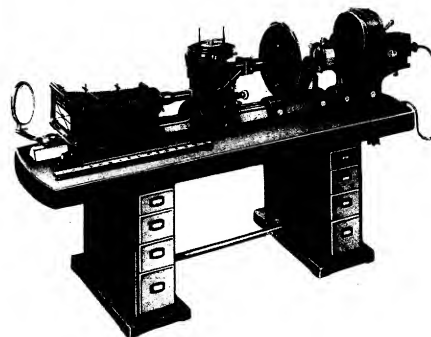


Fig. 40
MIM-8 Horizontal Metallographic Microscope

In its design features and optical characteristics, this microscope fully satisfies up-to-date requirements of metallography and provides for observing and photographing objects under the following conditions:

- a) bright field with normal and oblique illumination;
- b) dark field;
- c) polarized light.

Opaque objects are examined under the microscope in reflected light.

The optical system of the microscope (Fig. 41) comprises the following elements: light source — arc lamp 1 with clockwork mechanism, collector 2, heat filter 3 for



protecting the polarizer prisms from overheating, swing-out lens 4 used only for dark field observation, incandescent lamp 5 used for visual observation of objects with bright field (and sometimes for polarized light), light filters 6, polarizer 7 inserted into the system for polarized light observations, iris diaphragm 8 for adjusting the illumination of the object, illuminator lenses 9, 10 and 11, field and annular diaphragms 12 mounted in one strip, oblique illumination prism 13 for oblique illumination of the object, reflecting plate 14 for illuminating the object through the objective in bright field observation, annular mirror 15 and metallic condenser 16 for dark field illumination, objective 17, analyser 18 for observation of the object in

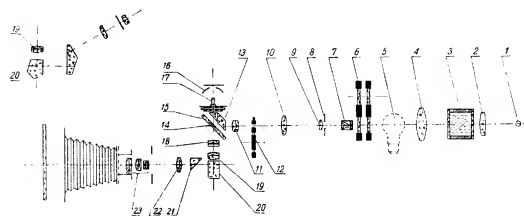


Fig. 41
Optical System of the MHM-8 Microscope

polarized light, achromatic lens 19 of the visual tube, prism 20 of the visual tube, prism 21 of the photographic tube, achromatic lens 22 of the photographic tube and Homal eyepiece 23.

With bright field observations the collector 2 forms an image of the source of light 1 on the aperture diaphragm 8.

An image of the aperture diaphragm is formed on the exit lens of the objective 17 by means of the system of three lenses (9, 10 and 11) and the plate 15. In this way, a pencil of light from the arc lamp 1, after passing through the aperture and field diaphragms, is thrown on plate 15. The latter reflects a portion of the light through the objective 17 to the object. The remainder of the light passes through the plate and does not take part in illuminating the object.

If the oblique illumination prism 13 is introduced in the optical system, all the light is reflected to the object, through the objective. For this reason, illumination by means of the prism illuminator is considerably brighter than when using the reflecting plate.

The metallic annular condenser 16 is used for dark ground observations. It has a reflecting parabolic mirror surface arranged around the objective 17. The swing-out lens 4 and the annular diaphragm are introduced when making dark field observations.

The hollow cylinder of light passes through the annular diaphragm to the annular mirror 15 in whose center the plate 14 is arranged. This mirror reflects rays

of light to the surface of the dark ground condenser 16 which converges them to the plane of the object.

Diffused rays of light, reflected from the object, as with light field observations, pass through the objective, reflecting plate and achromatic lenses to the visual tube or photographic camera and produce an image of the object.

The arc lamp is too bright for visual observation and consequently, for this purpose, an incandescent bulb 5 is used and located directly in front of the aperture diaphragm 8.

The microscope comprises four main parts: a) illuminating system; b) the microscope proper; c) the photographic camera arranged on a massive base and d) the special table.

The optical bench is a bar of prismatic cross-section with slots for erecting the separate parts of the instrument.

The arc lamp, mounted in a housing, is fastened to the bench with a special screw. The carbons are held in special clamps which are fed by the clockwork mechanism. The mechanism and the carbons are enclosed in a hood which can be lifted for changing carbons. The arc lamp is supplied from a 127 or 220 V mains in series with a rheostat.

The housing of the incandescent lamp is fastened on a holder together with the opaque screen. The mechanism with the lamp can be brought out of the optical system simply by being swung downward. The screen serves to protect the observer from stray light.

On a holder, arranged directly after the arc lamp housing, the parabolic collector and the swing-out lens for dark field observation are fastened. The heat-absorbing device with distilled water is located after the collector.

The central part of the instrument comprises the microscope proper whose parts and mechanisms are mounted inside and outside of the casing fastened to the bench.

This part of the instrument comprises: the illuminating tube, central prism system, object stage, objective holder, coarse focusing mechanism, fine focusing mechanism, monocular or binocular attachments and the tube connecting the microscope with the photographic camera.

The coarse focusing mechanism is connected with the object stage. Besides, the latter is provided with crosswise movement and rotates about a vertical axis. In this way, the object stage is universal in type.

The fine focusing mechanism is connected with the objective holder.

Unlike the majority of other microscopes, in the MHM-8 Microscope the objectives are not screwed into the tube but are inserted into a special bearing ring of the objective holder. This considerably simplifies changing objectives.

Another distinctive feature of the objectives of this microscope is that they are computed and corrected to an infinitely distant image.

The photographic camera, fastened to the bench, comprises the extensible bellows, front and rear boards, shutter, scale and mirror.

The photographic camera is designed for 13×18 cm plates but may also be used for 9×12 cm plates as well. The camera is furnished with a wooden plate holder.

The microscope table comprises: the table top and two cabinets with drawers for holding the accessories.



SPECIFICATIONS

Range of total magnification	from 45 \times to 1350 \times
Image scale when photographing	from 100:1 to 3000:1
Achromatic objectives for light and dark field:	11 \times 18 \times 40 \times
initial magnification	0.17 0.30 0.65
numerical aperture	23.17 13.89 6.16
focal length, mm	6.2 5.71 0.87
working distance, mm	15 \times 30 \times
Apochromatic objectives for bright and dark field:	15 \times 30 \times
initial magnification	0.30 0.65
numerical aperture	15.70 8.37
focal length, mm	4.9 0.87
working distance, mm	Achromat 90 \times Apochromats 60 \times 90 \times
Objectives only for bright field:	90 \times 60 \times 90 \times
initial magnification	1.25 0.95 1.30
numerical aperture	2.77 4.30 2.79
focal length, mm	0.44 0.22 0.20
working distance, mm	90 \times
Apochromatic objective only for dark field:	90 \times
initial magnification	1.00
numerical aperture	2.77
focal length, mm	0.68
working distance, mm	Focal length, Linear field of view, mm
Compensating eyepieces:	mm
3 \times	83 20
5 \times	50 20
7 \times	36 18
10 \times	25.2 13
15 \times	16.8 12
20 \times	12.6 9
Huyghenian eyepieces:	Focal length, Linear field of view, mm
4 \times	62.8 20
7 \times	35.9 18
10 \times	25 14
15 \times	17 8
Homal eyepieces:	
Type II	70.36 15
Type IV	20.28 8
Type VI	37.61 13
Illuminating system	are lamp or incandescent bulb with illuminator
Object stage	circular, with rotary and cross-wise movements
Focusing	object stage adjustment: coarse — by rack and pinion; fine — by micrometric mechanism, reading 0.002 mm
Plate size, cm	13 \times 18 or 9 \times 12
Set of light filters	yellow, green, orange, yellow-green, sky-blue and blue
Max. allowable load on object stage, kg	10
Overall dimensions of microscope (length \times width \times height) mm	1800 \times 630 \times 490
Overall dimensions of case, mm	2100 \times 550 \times 900
Weight of microscope, kg	103.6
Weight of microscope in case, kg	195.6

MICROSCOPE SET

Table with two cabinets and optical bench.
Microscope with inclined tube for visual observation, object stage, illuminator with swing-out polarizer, coarse and fine focusing mechanisms, objective holder and adapter tube for photographic camera

Apochromatic objectives in cases:	15 \times \times 0.30
	30 \times \times 0.65
	60 \times \times 0.95
	90 \times \times 1.30
	90 \times \times 1.00
Achromatic objectives in cases:	11 \times \times 0.17
	18 \times \times 0.30
	40 \times \times 0.65
	90 \times \times 1.25

Compensating eyepieces: 3 \times , 5 \times (2 pieces), 7 \times (3 pieces), 10 \times , 15 \times , 20 \times
Huyghenian eyepieces: 4 \times , 7 \times , 10 \times , 15 \times
Homal eyepieces: II, IV, VI
Magnifying glass 8 \times
Binocular attachment
Stage micrometer, opaque, in case
Lamp I with ring
Lamp II with ring
Lamp III with ring
Additional ring for lamp
Inserts for object stage (glass) (2 pieces)
Inserts for object stage (metal) (3 pieces)
Crosswire for centring stage
Eyepiece attachment
Holder for unstable objects
Object stage clips (2 pieces)
Vial with immersion oil
Protecting cap for the objective socket
Caps for photographic tube (2 pieces)
Caps for the visual tube (2 pieces)
Marking apparatus
Arc lamp with clockwork mechanism
Collector
Rheostat, 3.5 ohm, 10 A
Opal electric bulb 40 W, 120 V (3 pieces)
Swing-out lens in mount
Hollow heat absorbing device
Plate holder 13 \times 18 cm (3 pieces)
Holder with opaque screen, revolving discs with light filters and lamp housing
Opal glass in frame
Adapter
Metal plate holders, 9 \times 12 cm (6 pieces)
Metallic diaphragms (3 pieces)
Photographic camera
Arc lamp carbons, 5 mm (100 pieces)
Arc lamp carbons, 9 mm (100 pieces)
Cord for connecting microscope illumination
Squirrel-hair brush
Flannel napkin
Cambric or madapolam napkin
Watchmaker's screwdriver (2 pieces)
Can with lubricant
Cover
Description and instruction manual
Certificate



VERTICAL METALLOGRAPHIC MICROSCOPE, MODEL MHM-6

The MHM-6 Microscope (Fig. 42) is a vertical metallographic microscope, designed for the examination of the microstructure of metals.

The Microscope provides for the examination of opaque objects with bright field or polarized light as well as for the photography of these objects.

The set of objectives and eyepieces provides for a total magnification up to 600 \times for visual observation and photography.

The design features of the microscope and its optical characteristics fully satisfy up-to-date requirements of metallographic research.

The Vertical Metallographic Microscope finds wide application in industrial, educational and scientific research laboratories.

As the Vertical Metallographic Microscope is designed for the examination of opaque objects, observation is carried out with reflected light.

Fig. 43 shows the optical system of the instrument.

Light from the lamp 1 passes through the condenser 2, aperture diaphragm 3, lens 4, field diaphragm 5, lenses 6 and 7 and falls on the plane glass plate 8 of the central illuminator. The plate is positioned at an angle of 45 $^{\circ}$ to the axis of the tube.

The object is illuminated, by reflected light, by means of this plate. A part of the light is reflected by the plate through the micro-objective 9 to the object 10. In

this way, the objective 9 is used not only for providing an image of the object but also as a part of the illuminating system.

Oblique illumination of the object can be effected by displacing and subsequently rotating the aperture diaphragm.

The condenser 2 forms an image of the light source 1 on the aperture diaphragm 3. An image of the aperture diaphragm is formed on the end lens of the objective 9 by means of the lens system 6 and 7 and the plate 8.

Rays, reflected from the object, pass again through the objective 9 and plate 8 to the prism 11 from where they are directed to the eyepiece 12. The objective 9 forms an image in the focal plane of the eyepiece 12.

During photography the prism 11 is swung out of the microscope axis and the beam of rays passes through the photographic eyepiece 13 and is reflected by the

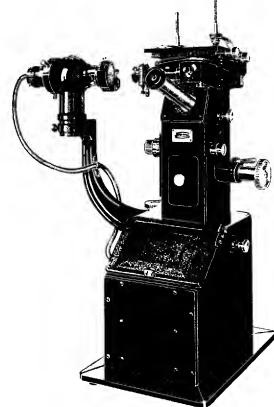


Fig. 42
MHM-6 Vertical Metallographic Microscope

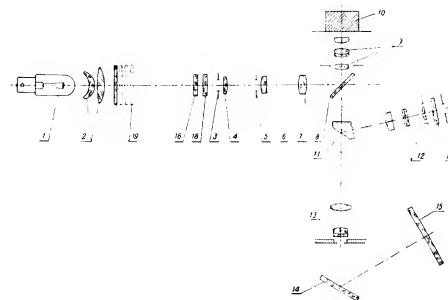


Fig. 43
Optical System of the MHM-6 Microscope

mirror 14 on the opal glass 15 of the photographic camera. An image is formed on this glass.

For work with polarized light, the superimposed polarizing filters are brought in the optical system. Filter 16, a polarizer, is inserted into the illuminating system before the illuminator lens 6 while the second filter 17, used as an analyzer, is superimposed on the eyepiece 12.

To create more uniform illumination of the object, the semi-opal plate 18 is arranged before the aperture diaphragm 3.

The interchangeable light filters 19 can be brought in the optical system to provide monochromatic illumination.

Fig. 44 shows the main parts of the Vertical Metallographic Microscope.

The instrument comprises three main assemblies: a) illuminating device 1 fastened on bracket 2; b) upper housing 3 with the illuminator tube 4, visual tube 5, object

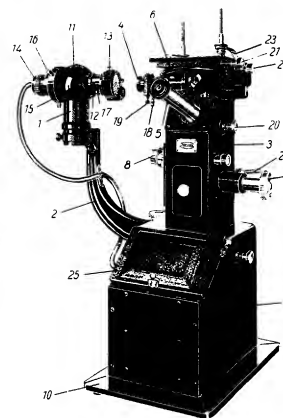


Fig. 44
Main parts of the MHM-6 Microscope



stage 6 and the coarse and fine focusing mechanism 7 and 8; e) lower housing 9 with the photographic camera and the base 10.

The illuminating lamp is arranged inside a spherical housing 11 on which are mounted the condenser body 12 and the camera 13 with a set of light filters.

The lamp holder 14 is inserted into a sleeve of the centring ring 15. The screws 16 serve to center the lamp.

Button 17 adjusts the condenser along the optical axis to regulate the illumination of the object.

The handles 18 and 19 serve for adjusting the opening in the aperture and field diaphragms. The latter are iris diaphragms with openings that can be varied from 0.8 to 7.5 mm.

Head 20 swings the prism in the system for visual observation or swings it out for photography.

The instrument has provisions for separate adjustment of the object stage 6 by rotating the coarse focusing head 7 and of the illuminator and objective by rotating the fine focusing head 8.

The object stage is arranged so that the object is placed over the objective with the polished surface directed downward.

The stage is square and does not have a rotary movement but has cross-wise adjustment actuated by rotating the heads 21 and 22.

The object is held by the clips 23 and a special fixture for clamping unstable objects (not illustrated).

A clamping device, on the shaft of the coarse focusing head 7, is provided to prevent the object stage from running down of its own weight. This device is actuated by the handle 24.

The visual tube 5 is arranged at an angle of 75° to the upper housing.

The lower housing 9 contains the photographic camera for 9×12 cm plate-holders and the opal glass covered by the lid 25.

The microscope is stored in a wooden case containing a full set of accessories.

SPECIFICATIONS

Range of total magnification:			
visual observation	up to $600\times$		
photography	up to $600\times$		
Achromatic objectives:	$9\times$	$21\times$	$40\times$
initial magnification	$9\times$	$21\times$	$40\times$
focal length, mm	18.2	8.4	4.6
numerical aperture	0.20	0.40	0.65
working distance, mm	8.7	1.9	0.66
Photographic eyepieces:	$6.5\times$	$10\times$	
magnification	$6.5\times$	$10\times$	
focal length, mm	38.28	25.0	
Symmetrical eyepiece for photography:			
magnification	$15\times$		
focal length, mm	17.0		
Huyghenian eyepieces:	$7\times$	$10\times$	$15\times$
magnification	$7\times$	$10\times$	$15\times$
focal length, mm	36.17	24.76	16.9
Light source	electric bulb, 8V, 20W with vertical illuminator		

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Focusing adjustments:	
coarse	by rack and pinion for object stage
fine	by micrometric mechanism moving the illuminator and objective, reading to 0.002 mm
Object stage	square with lateral and transverse movement and special circular attachment for rotating specimen
Plate size, cm	9×12
Overall dimensions of microscope (height \times length \times width), mm	$480 \times 410 \times 300$
Overall dimensions of case, mm	$540 \times 515 \times 355$
Weight of microscope, kg	17
Weight of microscope in case, kg	34

MICROSCOPE SET

Microscope stand with coarse and fine focusing mechanisms, object stage, illuminating system with a set of light filters, inclined tube for visual observation and photographic camera

Achromatic objective, $9\times$ / 0.20, in case
 Achromatic objective, $21\times$ / 0.40, in case
 Achromatic objective, $40\times$ / 0.65, in case
 Huyghenian eyepiece for visual observation, $7\times$
 Huyghenian eyepiece for visual observation, $10\times$
 Huyghenian eyepiece for visual observation, $15\times$
 Eyepiece for photography, $6.5\times$
 Eyepiece for photography, $10\times$
 Eyepiece for photography, $15\times$ (symmetric)
 Eyepiece attachment with light filter
 Holder for unstable objects
 Object stage clips (2 pieces)
 Glass stage micrometer in case
 Object stage inserts (3 pieces)
 Magnifier, $8\times$
 Bulb 8V, 20W (2 pieces)
 Can with lubricant
 Metal plateholder, 9×12 cm (3 pieces)
 Squirrel-hair brush
 Flannel napkin
 Transformer 110/127/220 8V
 Frame with opal glass
 Caps (2 pieces)
 Cover
 Case for accessories
 Description and instruction manual
 Certificate

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ELECTRON MICROSCOPE, MODEL 3M-3

The best modern optical microscopes provide for a magnification of the object not exceeding 1400 \times . Magnification beyond this limit with an optical system does not reveal new details but merely make the pictures larger.

The resolving power of an optical microscope is limited to about one half of the wave length of the light employed.

With visible light, objects, having a size not less than 0.2 microns, can be separated.

Further penetration into the world of micro objects, inaccessible to the most highly perfected optical microscopes, became possible only with the advent of electron radiation in microscopy. Electron beams have wavelength many times shorter than light beams.

Instruments, by whose aid electron beams provide images of objects, have been called electron microscopes.

Modern electron microscopes provide an effective magnification up to 100000 \times . This allows objects, considerably more minute than in optical microscopes, to be observed and studied at ease.

The 3M-3 Electron Microscope (Fig. 45) is constructed with full application of electromagnetic optics.

It provides for a magnification from 250 \times to 25000 \times for normal exposures of the object and when better exposures are obtained, up to 100000 \times .

By using one or another of the methods known for preparing the specimen, the electron microscope allows the observation of almost all of the objects studied under optic microscopes.

The Electron Microscope, Model 3M-3 can be successfully used in research on biological specimens, bacteria, viruses, colloidal solutions, dyes, silicates, thin metal films obtained by vaporization in a vacuum, rubbers, caoutchouc, plastics, structures of metals and their alloys, etc.

All of the component elements of the electron microscope are analogous to the corresponding elements in the optical microscope, but are replaced by electrical devices.

The source of light is replaced by a source of electrons and the glass lenses are replaced by magnetic ones.

The image, produced by the electrons, may be either viewed on a fluorescent screen, which is luminous under the action of the electrons, or it may be revealed by the photographic layers which are darkened by electrons in the same way as ordinary photographic plates are darkened by light rays.

Fig. 46 illustrates the electron optical ray path of the 3M-3 Electron Microscope. The electron beam is produced by an "electron gun" comprising a tungsten filament 1 0.1 mm in diameter, heated by an electric current and the anode 2.

The electrons, leaving the filament, are accelerated by the electric field applied between the filament and the anode.



Fig. 45
3M-3 Electron
Microscope

The electrons, which are further to be used in forming the image, pass through an aperture in the center of the anode.

Electrons, from the "electron gun" pass further on by inertia until they reach the field of the first magnetic condenser lens 3. The latter changes their direction so that they are focused on the specimen 4.

The origin of the contrasts in the image, as obtained in the Electron Microscope, is caused by the fact that various portions of the specimen diffuse the electrons in different manner.

Only those electrons, which are deviated through comparatively small angles when passing through the specimen, are focused on the first screen 5 located before the magnetic projection lens 6. The corresponding portions of the screen will be lighted.

If the electrons, when passing through the specimen, are deviated through large angles, they are, for the most part, cut off by the aperture diaphragm 7 inside the objective 8. The corresponding elements of the image on the screen will be dark.

The screen for the intermediate image has an opening in the center through which the electrons, corresponding to the part of the image in the zone of the opening, pass to the second magnifying electromagnetic lens.

The electrons are again focused in the magnetic field of the projector lens and a magnified image of the object is produced on the final image screen 9 located in the lower part of the microscope.

As the electrons are stopped by air molecules, all air must be evacuated from their path in the instrument. In this way, the Electron Microscope is a vacuum instrument with continuous air evacuation.

The Electron Microscope has been designed as a column erected on a special desk fastened to a cabinet behind the column.

The following main parts of the microscope are arranged in the column:

a) illuminating system of the microscope comprising the electron source ("electron gun") and the magnetic condenser lens focusing the electrons on the object which is to be examined;

b) specimen chamber with object stage: the design of the stage allows the object to be moved in two perpendicular directions, as well as to be tilted through an angle of 4 $^{\circ}$ to either side for producing pairs of stereomicrographs;

c) electromagnetic objective lens which provides the first magnification of 130 \times of the observed object on the first screen;

d) electromagnetic projector lens which allows the image to be remagnified in a range from 2 \times to 192 \times . In this way, the total magnification of the microscope can be varied, by means of these lens from 250 \times to 25000 \times ;

e) photographic camera of the microscope with a fluorescent screen for obtaining the final image and the plate holder device located under the screen.

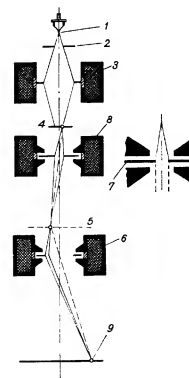


Fig. 46
Electron Optical Ray Path



The photographic camera has three viewing ports for observation of the final image. They are arranged so as to provide convenient observation through any port.

During photography exposition is accomplished by means of the screen which, at the same time, fulfills the functions of a camera shutter.

Small viewing ports are arranged on the front of the column for watching the electron beam path in the microscope and for viewing the image on the first screen of the projector lens.

The objective lens and the photographic camera are furnished with special doors through which the specimen may be mounted on the object stage or the plate holders may be charged and removed from the microscope.

The vacuum equipment of the microscope consists of the microscope column, the preliminary vacuum pump, the oil-diffusion vacuum pump, the vacuum pipelines and a special distributing mechanism which provides the required vacuum arrangements during microscope operation.

The distributing mechanism is connected by vacuum pipelines to the microscope column and to both vacuum pumps. By means of the distributor, air entering the microscope first passes through a chemical dryer located under the desk.

The controls of the distributing mechanism is furnished with a special indicator which shows the vacuum conditions in the microscope.

All the elements of the electrical supply system of the microscope, except the resonant voltage stabilizer, are mounted in the microscope cabinet.

The resonant voltage stabilizer, whose operation is accompanied by strong stray magnetic fields, should be sufficiently distant from the microscope (it is usually erected in a neighbouring room).

The design and wiring of the electric supply system is arranged in five independent units: distribution switchboard, control desk, low voltage unit, high voltage unit and the high frequency transformer. The power supplies are divided into two main lines: low voltage and high voltage supplies.

The main part of the supply circuit is connected to a 220V three-phase line through the resonant voltage stabilizer.

The low voltage supplies feed the "electron gun" filament, the magnetic lens coils as well as the vacuum pump electric motor, the oil-diffusion pump heater, the thermo-couple vacuum gauge and all the electric bulbs for illuminating the scales of the instrument.

The high voltage supplies provide the Electron Microscope with a voltage of 50 kV in steps of 30, 40 and 50 kV.

The microscope cabinet is furnished with a special discharging device brought into action when any of the cabinet doors or the "electron gun" cowl is opened. This device serves to protect the observer in accidental cases or erroneous operation.

SPECIFICATIONS

Optical characteristics of the instrument

Electronic-optical magnification:	
without projector lens pole pieces	from 250 \times to 1100 \times
with low magnification pole pieces	from 2000 \times to 10000 \times
with high magnification pole pieces	from 5000 \times to 25000 \times
Resolving power of the microscope	up to 20 Angstrom units
Useful photographic enlargement	up to 100000 \times

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Power supply characteristics

Line voltage supplied to microscope	3-phase, 220V, 50 c. p. s.
Accelerating voltage of Electron Microscope, kV	first step — 30 second step — 40 third step — 50
High tension current, mA	up to 170
Total power consumption, kW	up to 2

Research Facilities

Visual observation and photography of the image of the object, observed in transmitted electron beam.

Stereoscopic photography at a stereoscopic angle of 8°. Electron diffraction patterns of the specimen area can be made with an electron diffraction unit.

Photographic Arrangement

Four exposures, mm	45 \times 45
--------------------	----------------

Vacuum Characteristics

Operating vacuum	1.10 $^{-1}$ to 5.10 $^{-1}$ mm Hg
Time for creating operating vacuum with normal cycle (air — preliminary vacuum — operating vacuum)	3—4 minutes after replacing specimen; 10—12 min. after replacing photographic plates

Overall Dimensions and Weight of Instrument

Height of microscope, mm	2080
Width of microscope (without preliminary vacuum pump), mm	630
Width of microscope with pump, mm	870
Length of microscope (cabinet and desk), mm	870
Length of microscope with pump, mm	1300
Weight of complete microscope set, kg	980

ELECTRON MICROSCOPE SET

Microscope column
Microscope desk with vacuum distributing mechanism
Microscope cabinet
Control panel
Low-voltage unit
High-voltage unit
High-frequency transformer
Distribution switchboard
Oil-diffusion vacuum pump
Electron diffraction unit
Preliminary vacuum pump
Resonant voltage stabilizer
Vibration insulators (7 pieces)
Plate holders (2 pieces)
Magnifiers in mounts (3 pieces)
Object stage with objective lens pole pieces
Low magnification pole pieces for projector lens
High magnification pole pieces for projector lens
Steel needle in mount
Brass needle in mount
Stage for drying specimens

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Fixture for assembling "electron gun" housing
 Box with caps for the specimens (9 pieces)
 Ampules with oil for oil-diffusion pump (3 pieces)
 Fixture for welding filaments
 Tank with oil for preliminary vacuum pump
 Set of tools (wrenches) (15 pieces)
 Diaphragms (10 pieces)
 Holders for specimens with caps (5 pieces)
 Filament assemblies (25 pieces)
 Bushing with diaphragm
 Large valve
 Small valve
 Resistors (2 pieces)
 Spare bellows (8 pieces)
 Sockets for electron diffraction unit (8 pieces)
 Rubber gaskets and rings (30 pieces)
 Fuses for 10A, 5A, 2A and 0.5A (10 pieces)
 Screen axle collars (2 pieces)
 Porcelain rods (2 pieces)
 Straps for clamping rings (10 pieces)
 Specimen grids (500 pieces)
 Electric heater coils for oil-diffusion pump (2 pieces)
 Diaphragms for low magnification pole shoe (2 pieces)
 Diaphragms for high magnification pole shoe (2 pieces)
 Screws and bolts (35 pieces)
 Tungsten wire, 0.1 mm diameter (2 m)
 Rubber hose (20 m)
 Discharge tube rectifiers, type 6T-129 (4 pieces)
 Electronic tubes, type 6X7 (4 pieces)
 Electronic tubes, type 6U3 (10 pieces)
 Stabilizers (2 pieces)
 Kenotrons, type B 40/100 (3 pieces)
 Neon tube, type M1-7
 Electric bulbs for illuminating scales (3 pieces)
 Thermoelectric lamp, type IT-2
 Automobile bulbs, type A-16 (3 pieces)
 Boxes for accessories (3 pieces)
 Storage cases (4 pieces)
 Description and instruction manual
 Certificate

Vueshtorgizdat, Order No. 3227

VSESOJUSNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

"STANKOIMPORT"

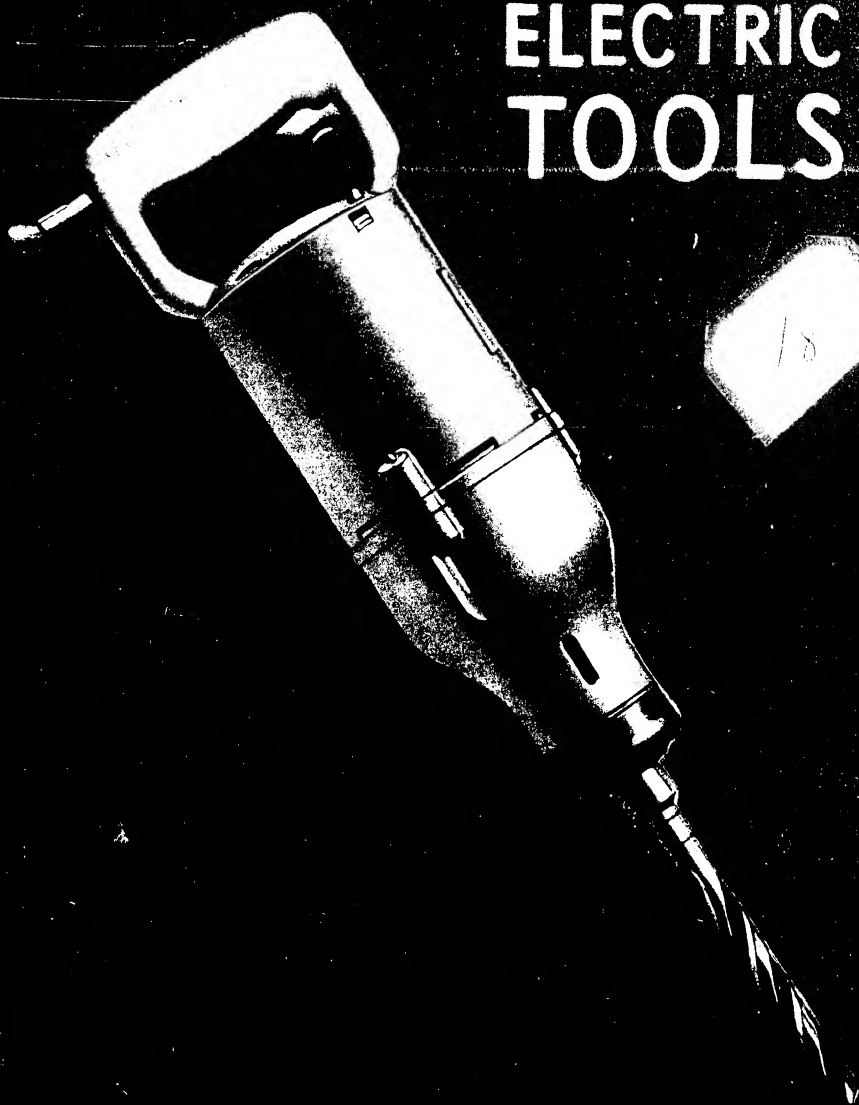
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Design and specifications of microscopes illustrated herein are subject to change without notice

PORTABLE ELECTRIC TOOLS



PORTABLE ELECTRIC TOOLS



50X1-HUM



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PORTABLE HIGH FREQUENCY ELECTRIC TOOLS

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PORTABLE ELECTRIC TOOLS

Portable Electric Tools produced in the U. S. S. R. are outstanding for their high efficiency, convenience and safety in handling and long service.

The tool housings are made of light aluminium alloys, due to which the tools are light in weight and remarkably strong.

The tool handles with trigger switches placed on them, as well as the control devices, ensure easy handling and do not distract the operator's attention from the main object of his job.

The electric motors, both the universal and three-phase ones, are manufactured with great accuracy of first-class materials, have proper cooling facilities and are noted for their long life.

The reduction gears, spindles, ball and roller bearings and other parts are of high workmanship and ensure noiseless operation and long trouble-free service of the tool.

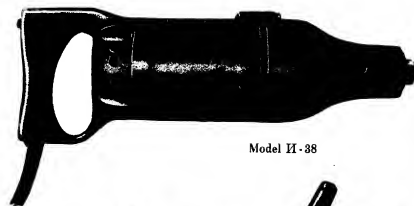
ELECTRIC METAL-WORKING DRILLS, MODELS И - 38, И - 28, И - 29

The И-38, И-28 and И-29 Electric Drills are designed for drilling holes up to 15, 20 and 23 mm in diameter respectively in steel with a tensile strength up to 45 kg/mm² as well as in other metals.

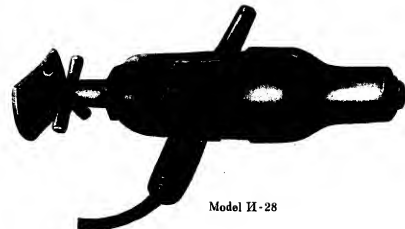
The Electric Drills are widely used in boiler smith's works, for shipbuilding, carbuilding, locomotive engineering, for the production and installation of metal structures, sanitary engineering work, etc. The Electric Drills may be also used for cleaning surfaces with a metal brush, for grinding, polishing and similar work. In such cases a different tool, suitable for the work in view, is fitted into the tapered spindle hole in place of the drill.

Models И-38 and И-28 Electric Drills are powered by universal single-phase motors operating on A. C. or D. C. supply of normal frequency. Model И-29 Electric Drill is furnished with a three-phase motor having a stator winding which provides star-delta connection.

The rotor shaft of the motor is mounted on ball bearings. The motor is cooled by a fan fitted to the motor shaft. The cooling air is drawn in and driven out through special vents in the Drill housing. A gear either cut on the end of the rotor shaft (Models И-38 and И-28) or keyed to it (Model И-29) transmits power to the gear fixed on the spindle through an intermediate gear train which serves as a reducer in the transmission system from motor shaft to spindle.



Model И - 38

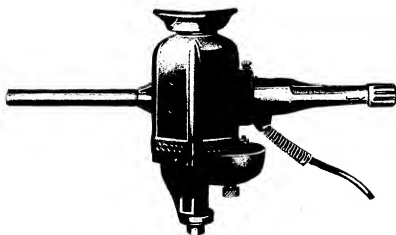


Model И - 28



The M-38 and M-28 Electric Drills have their spindles mounted on two radial thrust ball bearings. The spindle of the M-29 Electric Drill is mounted on a bronze sleeve and a thrust ball bearing. The intermediate gear train runs in ball bearings.

The motor is started and stopped by means of a switch fitted to the drill handle.



Model M-29

SPECIFICATIONS

Item	Electric Drill Models		
	M-38	M-28	M-29
Drilling capacity in steel, mm	15	20	23
Spindle speed, r. p. m.	600	350	200
Morse taper in spindle	No. 1	No. 2	No. 2
Distance from center of spindle to outer of casing	60	58	87
Electric motor:			
type	universal single-phase	universal single-phase	induction, 3-phase
horsepower, watts	275	360	600
speed, r. p. m.	12000	12000	3000
electric current	D. C. or A. C.	D. C. or A. C.	A. C., 3-phase
voltage, v	220 or 120	220 or 120	220 or 127
Overall dimensions, mm	120 × 365	395 × 510	350 × 650
Net weight, kg	3.8	8.0	11.0



ELECTRIC METAL-WORKING SHEARS, MODELS M-30, M-31

The M-30 and M-31 Electric Shears are designed for cutting and trimming sheet steel up to 1.5 and 2.7 mm thick respectively (for steel with a tensile strength of 45 kg/mm²) as well as other sheet metals. The Electric Shears are widely used for roofing, sanitary engineering and other purposes.

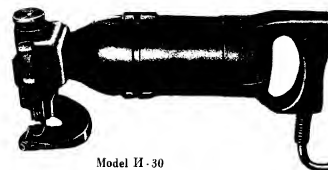
The Electric Shears are powered by universal single-phase motors operating on A. C. or D. C. supply, 50 cycles.

The rotor shaft of the motor is mounted on two ball bearings. The cooling of the motor is accomplished by a fan pressed on the rotor shaft. The cooling air is drawn in and driven out through special vents in the cast aluminium housing of the shear.

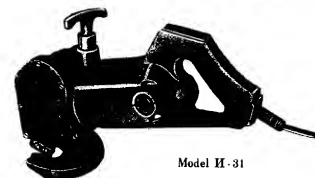
Power is transmitted through a reducer from the motor shaft to an eccentric shaft.

The M-31 Shear have a worm wheel serving as a reducer and the M-30 Shear — two pairs of gears, the driving gear being cut on the end of the rotor shaft and the driven one keyed to the eccentric shaft. The latter is mounted on ball bearings and serves for transforming the rotating motion of the rotor into the reciprocating motion of the tool-holder carrying the moving blade. The fixed blade is clamped to an anvil.

The spacing of the cutting blades is adjusted by means of set-screws. The motor is started by a switch fitted to the handle.



Model M-30



Model M-31



SPECIFICATIONS

Item	Electric Shear Models	
	И-30	И-31
Maximum thickness of steel sheets, mm	1.5	2.7
Strokes per minute	1400	1650
Electric motor:		
type	universal single-phase	universal single-phase
horsepower, watts	250	370
speed, r. p. m.	12000	
electric current	D. C. or A. C.	D. C. or A. C.
voltage, v	220	220
Overall dimensions, mm	160 × 370	245 × 390
Net weight, kg	5.3	10

FLEXIBLE SHAFT ELECTRIC GRINDER, MODEL И-54

The И-54 Electric Grinder is designed for smoothing welds, chamfering, removing rust from metal structures as well as for carrying out various grinding operations on metal, cement, concrete and wood articles. These operations are accomplished by means of grinding, leather or felt wheels, rubber wheels with emery cloth or by steel brushes.

The Electric Grinder consists of an electric motor mounted on a stand, a flexible shaft and two changeable grinding heads.



The electric motor is an induction one, operating on three-phase current supply, with a squirrel-cage rotor. The motor is mounted on the stand in a way to allow free swivelling in the horizontal plane. The motor is cooled by a fan mounted on the rotor shaft.

Power is transmitted from the motor to the shaft of the grinding head through a flexible shaft having a right-hand rotation.

The Grinder may be furnished either with a straight or with a right-angle grinding head. The straight grinding head is designed for performing grinding operations with the periphery of the wheel and consists of a housing, a handle, two flanges, a guard and a wheel spindle. The right-angle grinding head is designed for grinding with the face of a cup wheel and consists of a housing, a handle, a reducer and a wheel spindle.

SPECIFICATIONS

Grinding wheel diameter, mm	200
Grinding wheel speed, r. p. m.:	
straight grinding head	2850
right-angle grinding head	4000
Electric motor:	
horsepower, watts	1000
speed, r. p. m.	3000
electric current	A. C., 3-phase
voltage, v	220
frequency, cycles	50
Overall dimensions, mm	265 × 315 × 360
Length of flexible shaft, mm	3000
Net weight, kg	32

ELECTRIC BENCH GRINDER, MODEL И-26

The И-26 Bench Grinder is designed for sharpening cutting chains of saws and mortisers, blades of electric planers, drills and other small tools for wood and metal.

The Grinder is mounted on a table or on a bench. The sharpening operation is accomplished by means of a grinding wheel fitted directly to the motor shaft.

The Grinder is furnished with a set of accessories for various tool-sharpening operations.

SPECIFICATIONS

Grinding wheel diameter, mm	100
Grinding wheel speed, r. p. m.	2800
Electric motor:	
horsepower, watts	450
electric current	A. C., 3-phase
voltage, v	127/220
frequency, cycles	50
Overall dimensions, mm	225 × 250 × 320
Net weight (without cable and tool rest), kg	12.4



ELECTRIC SCREW AND NUT DRIVER, MODEL И - 32

The И-32 Electric Screw and Nut Driver is designed for driving bolts and screws and for tightening nuts with a thread diameter up to 16 mm.

The Electric Screw and Nut Driver consists of a universal single-phase motor, a gear reducer, a spindle and a tool-holder placed in a cast aluminium housing. A handle with a cable and a switch is fitted to the housing.

The motor is cooled by a fan mounted on the rotor shaft.

The reducer consists of two pairs of gears, the driving wheel being cut on the end of the rotor shaft and the driven one keyed to the spindle end. The hollow steel spindle runs in ball bearings. When pressure is applied to the nut (bolt or screw), the spindle and the tool-holder contact each other through cams on the flange faces which transmit power from the spindle to the Driver.

A spring is placed within the spindle, serving to release the Screw Driver head when running idle.

The Screw Driver is furnished with a set of Screw Driver bits (4 pcs.).

**SPECIFICATIONS**

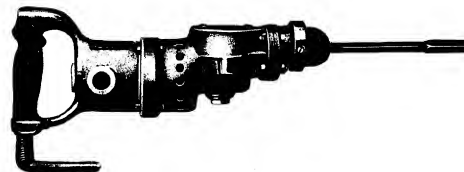
Maximum screw and nut thread diameter, mm	16
Spindle speed, r. p. m.	756
Electric motor:	
horsepower, watts	275
electric current	D. C. or A. C.
voltage, v	110 or 220
frequency, cycles	50
Overall dimensions, mm	120 X 445
Net weight, kg	4

**ELECTRIC HAMMER, MODEL И - 33**

The И-33 Electric Hammer is designed for punching holes up to 30 mm in diameter in brick and concrete when carrying out building, sanitary engineering and electric installation work.

The Electric Hammer consists of a universal single-phase motor, a reducer, a device for transforming the rotating motion of the motor shaft into the reciprocating motion of the piston and a set of tools. The motor and all mechanisms of the Hammer are placed in cast aluminium housings fastened to each other by screws. A handle with a cable and a switch is fitted to the upper part of the motor housing. The motor is cooled by a fan mounted on the rotor shaft. The reducer consists of a pair of bevel gears transmitting power from the motor shaft to the shaft of the motion transforming device. The latter consists of a crank with a driving roller. The crank communicates motion to the plunger, placed in a guide sleeve and striking blows on the hammer die. The changeable working tool is clamped in a thrust sleeve by means of set-screws.

All rotating parts are mounted on ball bearings. The switch is of the double-pole, trigger type.

**SPECIFICATIONS**

Maximum hole diameter, in brick or in concrete, mm	30
Number of blows per minute	2400
Energy of one blow, kg. m	0.3
Electric motor:	
horsepower, watts	360
electric current	D. C. or A. C.
voltage, v	220
frequency, cycles	50
Overall dimensions, mm	150 X 390
Net weight, kg	8.2

The hammer is furnished with a set of tools: chisels (3 pcs. of 20, 30 and 50 mm width) and a bull point tool.



ELECTRIC WOOD-WORKING DRILL, MODEL И - 27

The И-27 Electric Drill is designed for drilling holes up to 26 mm in diameter and a depth up to 1000 mm in logs, beams, boards and wooden constructions when fastening together various parts and joints by means of pins or screws.

The spindle of the Drill is powered by a three-phase induction motor with a squirrel-cage rotor through a reducer consisting of two pairs of gears. Drilling is accomplished by the Drill when the drill housing is lowered along the guiding rods.

Drilling may also be performed without the guiding rods.

**SPECIFICATIONS**

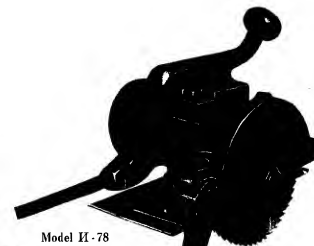
Drilling capacity in wood, mm	26
Maximum depth of drilling, mm:	
with guiding rods	350
without guiding rods	1000
Spindle speed, r. p. m.	430
Electric motor:	
horsepower, watts	430
speed, r. p. m.	3000
electric current	A. C., 3-phase
voltage, v	127/220
frequency, cycles	50
Overall dimensions (with stand), mm	210 × 280 × 1300
Net weight, kg:	
with stand	16.5
without stand	11.0

**ELECTRIC CIRCULAR SAWS, MODELS И - 78, И - 20**

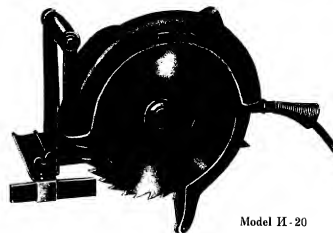
The И-78 and И-20 Electric Saws are designed for cutting wooden boards and beams up to 60 mm thick. The cutting may be done both along and across the grain. The Electric Saws may be also used for undercutting wood to a depth of 60 mm. For this purpose the saws are fitted with a special device for adjusting the depth of cut and for setting the saw blade at an angle of 45°.

The Electric Saw consists of a motor with a saw blade guard, a metal base plate for mounting the motor and a saw blade.

The motor is a three-phase induction one, with a squirrel-cage rotor. The motor is cooled by a fan mounted at the rear end of the rotor shaft. A handle with a double-pole switch is fitted to the motor housing.



Model И - 78



Model И - 20



The saw blade is fastened on the end of the rotor shaft running in two ball bearings. By means of a guide, the blade may be lowered to the required depth of cut. The setting and clamping of the saw blade at an angle of up to 45° is accomplished by a side guide. A side guiding bar with a ruler allows the cutting to be performed in accordance with the layout. The saw blade is protected by two guards — an upper and lower one. The lower guard automatically covers up the saw blade by means of a spring which eliminates any possibility of touching the blade during operation.

SPECIFICATIONS

Item	Electric Saw Models	
	И-78	И-20
Maximum depth of cut, mm	60	60
Diameter of saw blade, mm	180	250
Angle adjustment of saw blade	0 to 45°	0 to 45°
Saw blade speed, r.p.m.	2820	2750
Electric motor:		
horsepower, watts	600	800
speed, r.p.m.	3000	3000
electric current	A.C., 3-phase	A.C., 3-phase
voltage, v	220	220
frequency, cycles	50	50
Overall dimensions, mm	265×285×355	270×280×440
Net weight, kg	10.9	14

ELECTRIC CHAIN MORTISER, MODEL И-1

The И-1 Electric Chain Mortiser is designed for mortising rectangular holes, slots and grooves of various sizes in wood, for cutting rabbets and similar work.

Mortising of wood is accomplished by means of a highspeed cutting chain, consisting of a number of properly shaped links (cutters). The chain is driven by a sprocket keyed to the shaft of a three-phase induction motor with a squirrel-cage rotor. The chain is put on a ruler which serves for guiding and tightening it. By changing the cutting chain it is possible to obtain grooves of various sizes. The cutting chain is fed into the wood and automatically lifted up along guiding rods fastened in the base of the mortiser. The lifting device consists of a lever mechanism and two springs. The depth of mortising is adjusted by means of an adjusting ring fitted to one of the rods. A guiding bar, fastened in the base, serves to adjust the mortiser in accordance with the layout and ensures its stability in the course of operation.



SPECIFICATIONS

Size of mortise at one operation (corresponding to the size of chains), mm:	8 × 40 12 × 50 16 × 60 20 × 60
Maximum depth of mortise, mm	150
Electric motor:	
horsepower, watts	800
speed, r.p.m.	3000
electric current	A.C., 3-phase
voltage, v	220
frequency, cycles	50
Overall dimensions, mm	350 × 375 × 585
Net weight, kg	16.5



ELECTRIC PLANERS, MODELS И-25, И-24

The И-25 and И-24 Electric Planers are designed for planing various kinds of wood along the grain. Maximum width of chip is 60 and 100 mm respectively.

The planing is accomplished by means of four straight blades fastened in a special shoe which serves at the same time as the rotor of the electric motor.

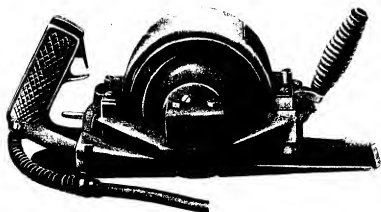
The depth of cut is adjusted by setting the panels in a proper position with regard to the cutting blades.

The electric motor is started and stopped by means of a trigger switch fitted to the rear handle.

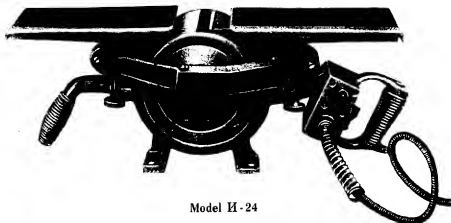


SPECIFICATIONS

Item	Electric Planer Models	
	И-25	И-24
Maximum width of cut, mm	60	100
Maximum depth of cut, mm	1.5	2
Peripheral speed of cutter block, m/sec.	20	22
Electric motor:		
horsepower, watts	130	340
speed, r.p.m.	3000	3000
electric current	A.C., 3-phase	A.C., 3-phase
voltage, v	127/220	127/220
frequency, cycles	50	50
Overall dimensions, mm	145×180×355	215×230×550
Net weight, kg	7.5	15.0



Model И-25



Model И-24



THREE-PHASE PLUG, MODEL И-73 А

The И-73 А Three-Phase Plug is used for connecting portable electric tools which operate on 36 or 220 volts. The plug consists of a cap and a socket placed in metal housings and fastened together by means of a round nut. The cap is connected to the tool by a cable and the socket — to the electric current circuit.



SPECIFICATIONS

Voltage, v	36 or 220
Ampere rating, a:	
at 36 v	25
at 220 v	6
Overall dimensions, mm	80 × 300
Net weight, kg	0.91



PORTABLE HIGH FREQUENCY ELECTRIC TOOLS

The Portable High Frequency Electric Tools represent the latest technical achievements in the field of manual electric tools.

They are noted for their small overall dimensions, light weight, high efficiency and complete safety in handling.

The high motor speed of these tools (12 000 r. p. m.) provides for a sufficiently high cutting speed, thus considerably increasing their efficiency, creating favourable conditions for the work of the cutting tool, ensuring smooth finish of the work surfaces and minimizing the operator's efforts.

The small overall dimensions and light weight of the tools make them extremely convenient and easy to handle.

The low voltage of the electric motor (36 volts) eliminates the possibility of a traumatic injury to the operator by the electric current and ensures complete safety during operation.

The tools are distinguished for their sturdy design, which, in combination with the high quality of the materials used for manufacturing the parts and excellent workmanship, ensure long and trouble-free service.

HIGH FREQUENCY ELECTRIC DRILLS, MODELS И - 74, И - 53, И - 58, И - 59

The И-74, И-53, И-58 and И-59 Electric Drills are designed for drilling holes of small diameters, i. e. 5, 8, 12 and 20 mm respectively, in steel with a tensile strength up to 50 kg/mm² as well as in soft metals and wood.

Each of the above Drills consists of an electric motor, a reducer and one or two (Model И-59) handles with a switch and a cable connected to it. The motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles and 36 or 220 volts. The rotor of the electric motor runs in two ball bearings.

The front end of the rotor shaft is made in the shape of a pinion, with seven corrected teeth which engage a gear with 37 teeth, the latter being keyed directly to the spindle (Model И-74) or incorporated in the intermediate reducer cluster gear (all other models).

Thus the reducer of the И-74 Drill consists of one pair of gears of which the driving gear is cut on the end of the rotor shaft and the driven gear keyed to the spindle.

The И-53 and И-58 Drills have a reducer consisting of two pairs of gears and the И-59 Drill of three pairs of which the driving gears are also cut on the rotor shaft and the driven gears keyed to the spindle.

The intermediate reducer cluster gear runs in ball bearings.

The motor is cooled by a fan pressed on the front part of the rotor shaft. The Drill housing consists of two aluminium castings, fastened together by screws. The motor is placed in the upper part of the housing having vents for the passage of cooling air. The lower part of the housing contains the spindle and the reducer. A handle with a switch and a cable is fitted to the upper part of the housing. The handle accommodates a built-in double-pole sliding momentary switch. The trigger mechanism of the switch has an additional locking button for continuous running. The handle also contains a 1.5 m cable serving to connect



Model И - 74



the Drill to the current circuit. A removable breast-plate may be fastened to the upper part of the *M-59* Drill housing. When the breast-plate is removed, the feed may be accomplished by a feed screw with a handwheel. For suspending the Drill beside a conveyor, the breast-plate is replaced by the upper cover with a ring.

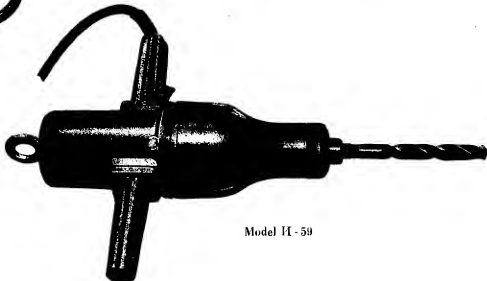
When ordering the *M-59* Drill it is necessary to indicate the modification required.



Model M-53



Model M-58



Model M-59



SPECIFICATIONS

Item	Electric Drill Models			
	M-74	M-53	M-58	M-59
Drilling capacity in steel, mm	5	8	12	20
Spindle speed, r.p.m.	2200	1300	750	350
Morse taper in spindle	external, short, No. 1a	external, short, No. 1b	No. 1	No. 2
Electric motor:				
horsepower, watts	200	200	400	800
speed, r.p.m.	12000	12000	12000	12000
electric current	A.C., 3-phase	A.C., 3-phase	A.C., 3-phase	A.C., 3-phase
voltage, v	36 or 220	36 or 220	36 or 220	36 or 220
frequency, cycles	200	200	200	200
Overall dimensions (without chuck), mm	70×140×120	70×140×250	95×115×350	110×350×455
Net weight (without chuck and cable), kg	1.6	1.8	3.6	7

HIGH FREQUENCY ELECTRIC SHEARS, MODELS *M-64*, *M-65*

The *M-64* and *M-65* Electric Shears are designed for cutting sheet steel to a thickness of 1.5 and 2.7 mm respectively, with a tensile strength of 45 kg/mm², as well as other metals.

The Electric Shears comprise an electric motor, a reducer transforming the rotating motion into the reciprocating motion, and a handle with a switch and cable.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles and 36 or 220 volts. The rotor of the electric motor runs in two ball bearings. The motor is placed in a cast aluminium housing with vents for the passage of cooling air.

The cooling is accomplished by a fan pressed on the front end of the rotor shaft.

The motor housing is fastened by means of screws to the reducer housing, the latter containing an eccentric shaft and a crank mechanism.

In Model *M-64* Shear power is transmitted to the eccentric shaft through a pair of gears, of which the driving gear (with 7 teeth) is cut on the rotor shaft and the driven gear (with 37 teeth) is keyed to the eccentric shaft.

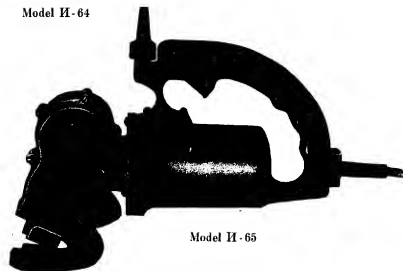
In Model *M-65* Shear, the front end of the rotor shaft carries a quadruple-threaded worm engaging the worm wheel with 29 teeth of the reducer. The eccentric shaft communicates a reciprocating motion to the upper moving blade. A tool-holder carrying a fixed blade is fastened to the lower flange of the reducer housing. The spacing of the blades is adjusted by means of set-screws.



A handle with a cable for connecting the Shear to the electric current and with a double-pole sliding switch is fastened to the motor housing by means of screws. The trigger mechanism of the switch has an additional locking button for continuous operation.



Model II-64



Model II-65

SPECIFICATIONS

Item	Electric Shear Models	
	II-64	II-65
Maximum thickness of steel sheets, mm	1.5	2.7
Strokes per minute	2200	1650
Electric motor:		
horsepower, watts	200	800
speed, r.p.m.	12000	12000
electric current	A.C., 3-phase	A.C., 3-phase
voltage, v	36 or 220	36 or 220
frequency, cycles	200	200
Overall dimensions, mm	85×240×250	100×280×350
Net weight, kg	2.5	9



HIGH FREQUENCY ELECTRIC GRINDERS, MODELS II-82, II-66

The II-82 and II-66 Electric Grinders are designed for smoothing welds, sanding down castings, removing burrs and for other grinding and smoothing operations on large and heavy workpieces.

The Grinder consists of an electric motor and a spindle with a grinding wheel.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles, 36 or 220 volts. The motor is placed in a cast aluminium housing with vents for the passage of cooling air.

The cooling is accomplished by a fan pressed on the front part of the rotor shaft. The rotor shaft runs in two ball bearings. The motor housing carries a handle with a cable and a switch on one side and the spindle housing with a second handle and a wheel guard on the other.

A pinion with seven teeth is cut in the front end of the rotor shaft. The pinion of the II-82 Grinder engages the slotted sleeve of the spindle and the pinion of the II-66 Grinder engages a gear with 24 teeth keyed to the spindle. The spindle runs in ball bearings.

The switch, mounted in the handle, is a double-pole trigger-type momentary switch.



Model II-82



Model II-66

SPECIFICATIONS

Item	Electric Grinder Models	
	II-82	II-66
Maximum grinding wheel diameter, mm	50	175
Spindle speed, r.p.m.	12000	3500
Electric motor:		
horsepower, watts	200	800
speed, r.p.m.	12000	12000
electric current	A.C., 3-phase	A.C., 3-phase
voltage, v	36 or 220	36 or 220
frequency, cycles	200	200
Overall dimensions, mm	70×420	190×550
Net weight, kg	1.8	6.2



HIGH FREQUENCY ELECTRIC HAMMER, MODEL И - 67

The И-67 Electric Hammer is designed for drilling, chiseling and bush hammering in concrete, brick or stone, for chipping and scaling castings and for various work requiring hammer action.

The main parts of the Hammer are the electric motor and the striking mechanism placed in a common housing.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles, 36 or 220 volts.

The rotor shaft is made solid with the sleeve of the striking mechanism and runs in two ball bearings. The rear bearing is mounted in the housing and the front bearing in a flanged bushing fitted to the face of the housing. The square hole of the bushing serves as a guide for the working tool. A spring keeping the tool from falling down is fitted to the outer flank of the bushing. The rear part of the housing carries a handle with a cable and a switch.

The cooling of the motor is accomplished by a centrifugal fan fastened on the sleeve of the striking mechanism. The cooling air is drawn in and driven out through special vents in the housing.

The front part of the hammer die has a square hole for fixing the tool.

When the motor is started the sleeve and bushing impart a rotating motion to balls which push forward the plunger and hammer die with the tool; in this position, however, the plunger and hammer die are disconnected and the hammer runs idle.

When the tool is pressed against the work, the hammer die comes into contact with the plunger that produces the first blow, plunger losing its rotation speed; due to recoil, the plunger returns backwards. Upon the plunger regaining its rotation speed the operation cycle is again repeated.

When using a tool with two squares, one of which fits into the flanged bushing and the other into the hammer die hole, the hammer die stops rotating and only a reciprocating motion is imparted to the tool.

When using a tool with one square, which fits into the hammer die hole, the rotating motion is imparted to the tool.

The number and energy of blows depend on the elastic limits of the material to be machined, on the tool weight and pressure of the tool against the work.

**SPECIFICATIONS**

Number of blows per minute	1000 to 6000
Energy of one blow, kg. m	up to 1
Electric motor:	
horsepower, watts	1400
speed, r. p. m.	12000
electric current	A. C., 3-phase
voltage, v	36 or 220
frequency, cycles	200
Overall dimensions (without tool), mm	110 × 520
Net weight (without tool and cable), kg	8.6

HIGH FREQUENCY ELECTRIC SCREW AND NUT DRIVERS, MODELS И - 60, И - 61

The И-60 and И-61 Electric Screw and Nut Drivers are designed for driving bolts and tightening nuts with a thread diameter up to 6 mm and 12 mm respectively.

Each Screw and Nut Driver consists of an electric motor, a reducer and one or two cam clutches providing a forced starting of the tool and its automatic stopping when a definite tightening effort has been achieved.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles, 36 or 220 volts. The rotor of the electric motor runs in two ball bearings.

The front end of the rotor shaft is made in the shape of a pinion with seven corrected teeth which engages a gear with 37 teeth incorporated in the intermediate reducer gear cluster. The electric motor is placed in a cast aluminium housing having vents for the passage of cooling air. The cooling is accomplished by a fan pressed on the front end of the rotor shaft. The И-60 Model has one handle and the И-61 two handles with a cable and a double-pole switch. The switch trigger mechanism has an additional locking button for continuous running. The И-61 model also has a ring for suspending it when the work is performed on a conveyor.

In the И-60 Model, the motion is transmitted from the rotor shaft through a reducer cluster gear to an intermediate shaft having face cams which engage the spindle key. The spindle key is pressed to the cams by means of a spring, the tension of which is adjusted by a nut. When the given torsional moment is attained, the key and the intermediate shaft become disengaged, thus ensuring a certain degree of tightening of the screw or nut. The И-61 Model has two cam clutches, one of which serves for setting the Screw and Nut Driver in motion and the other for automatically stopping it when a certain moment of torsion has been attained.

The spindle is furnished with a ball-shaped lock providing for quick and easy changing of tools.





Model II-60



Model II-61

SPECIFICATIONS

Item	Screw Driver Models	
	II-60	II-61
Maximum screw and nut thread diameter, mm	6	12
Spindle speed, r.p.m.	980	630
Number of strokes per minute	1960	2520
Electric motor:		
horsepower, watts	200	800
speed, r.p.m.	12000	12000
electric current	A.C., 3-phase	A.C., 3-phase
voltage, v	36 or 220	36 or 220
frequency, cycles	200	200
Overall dimensions, mm	70×140×300	115×470×600
Net weight, kg	2.2	8.7



HIGH FREQUENCY ELECTRIC SCREW DRIVER, MODEL II-62

The II-62 Electric Screw Driver is designed for driving screws with a thread diameter up to 6 mm.

The Screw Driver consists of an electric motor, a reducer and a gauged releasing cam clutch which serves for starting the tool and automatically stops driving the screw or nut when a certain torsional moment has been attained.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles, 36 or 220 volts. The rotor of the electric motor runs in two ball bearings.

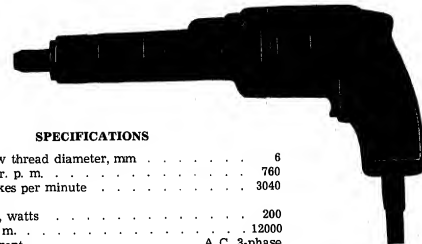
The front end of the rotor shaft is made in the shape of a pinion with seven corrected teeth engaging a gear with 37 teeth incorporated in the intermediate reducer cluster gear.

The electric motor is placed in a cast aluminium housing having vents for the passage of cooling air. The cooling is accomplished by a fan pressed on the front end of the rotor shaft.

A handle with a cable and a double-pole switch is attached to the motor housing by means of screws. The switch trigger mechanism has an additional locking button for continuous running.

The reducer is placed in a cast aluminium housing, fastened to the motor housing. The motion is transmitted from the rotor shaft through a reducer cluster gear to an intermediate shaft with face cams engaging the spindle key. The spindle key is pressed to the cams by a spring, the tension of which is adjusted by a nut. When the given torsional moment is attained, the key and the intermediate shaft become disengaged, thus ensuring a certain degree of tightening of the screw.

The spindle has a ball-shaped lock, providing for a quick and easy change of tools.



SPECIFICATIONS

Maximum screw thread diameter, mm	6
Spindle speed, r. p. m.	760
Number of strokes per minute	3040
Electric motor:	
horsepower, watts	200
speed, r. p. m.	12000
electric current	A. C., 3-phase
voltage, v	36 or 220
frequency, cycles	200
Overall dimensions, mm	70 × 140 × 320
Net weight, kg	2.2



HIGH FREQUENCY ELECTRIC STUD SETTER, MODEL И - 63

The И-63 Electric Stud Setter is designed for driving studs with a thread diameter up to 12 mm.

The Stud Setter consists of the following principal parts: electric motor and reversing reducer.

The electric motor is an induction one, with a squirrel-cage rotor, operating on a special A. C. three-phase circuit, 200 cycles, 36 or 220 volts. The rotor of the electric motor runs in two ball bearings. The front end of the rotor shaft is made in the shape of a pinion with seven teeth, engaging a gear with 41 teeth, incorporated in the intermediate reducer cluster gear which runs in two needle bearings. The 12-tooth gear of the cluster gear simultaneously engages a 28-tooth reversing gear (external gearing), and a 52-tooth working motion gear (internal gearing).



When pressure is applied to the Stud Setter, the spindle moves backwards, engages by its front key the face cams of the working motion gear and rotates in the same direction in which the stud is driven. When the tool is being withdrawn, the spindle moves forward, engages by its rear key the face cams of the reversing gear and rotates in the same direction in which the stud is unscrewed.

The electric motor and the reducer are placed in a cast aluminium housing with vents for the passage of cooling air.

Cooling is accomplished by a fan, pressed on the front end of the rotor shaft. A cover with a ring for suspending the Stud Setter when work is performed on a conveyor is attached to the upper part of the housing. The cable ends are led out into one of the handles, which accommodates a double-pole sliding switch.



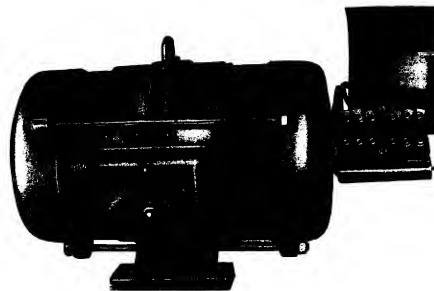
When switching over the motor phases, the Stud Setter may be used for driving studs with left-hand thread. The Stud Setter, with a tap fixed in the spindle, may also be used for tapping both right-hand and left-hand threads up to 10 mm in diameter.

SPECIFICATIONS

Maximum stud thread diameter, mm	12
Spindle speed, r. p. m.:	
forward	470
reverse	870
Electric motor:	
horsepower, watts	800
speed, r. p. m.	12000
electric current	A. C., 3-phase
voltage, v	36 or 220
frequency, cycles	200
Overall dimensions, mm	115 × 470 × 460
Net weight, kg	7.3

FREQUENCY CHANGER, MODEL И - 75

The И-75 Frequency Changer is designed for supplying electric current to the high frequency portable electric tools. It consists of a double-pole induction electric motor with a squirrel-cage rotor and a six-pole induction generator. The rotors of the motor-generator set have a common shaft and the stators are united by a common housing. The rotor shaft runs in two ball bearings.



The current is supplied to the stator windings of the motor and generator from a normal A. C. three-phase, 50 cycle circuit through a panel in which the terminals of the stator windings are installed. By rearranging the contact plates



on the panel it is possible to switch the changer to a 380 volt or 220 volt circuit. The transformed current of 200 cycles and 36 volts is fed from the rotor of the generator through terminals led out of the shaft holes to the contact rings fitted to the shaft end. The current is collected from the contact rings by brushes, the cables of which are connected with the 12-terminal panel board serving for direct switching of the distributing circuit or the current collectors.

The end of the shaft with contact rings, the brushes and the panel are protected by a folding cover.

SPECIFICATIONS

Electric current	A.C., 3-phase
Voltage, v:	
primary	380/220
secondary	36 ± 10 %
Frequency (synchronous), cycles:	
primary	50
secondary	200
Shaft speed, r. p. m.:	
synchronous	3000
on full load	2800
Input power, kw	5
Power factor of the set	0.7
Power factor of the electric motor	0.88
Output power, kva	3.5
Overall dimensions, mm	260 × 350 × 640
Net weight, kg	66



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Machine Tools
 Wood-Working Machinery
 Metal-Working Machinery (Presses, Hammers, Shears, Cold Roll Forming Machines, Punching Machines)
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 Testing Machines and Apparatus (for metals)
 Optical Instruments and Equipment
 Portable Electric and Pneumatic Tools (for metal and wood-working)
 Metal and Wood Cutting Tools
 Mechanic's Tools
 Lathe and Drill Chucks
 Sintered Carbide and Hard-Alloy Products
 Abrasive Products
 Ball and Roller Bearings
 Microscopes of all types
 Motion-Picture Equipment and Accessories
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 Photographic cameras, Binoculars, Magnifiers, Lenses
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 For cables: Stankoimport Moscow

Design and specifications of the tools illustrated herein are subject to change without notice.



ERRATA

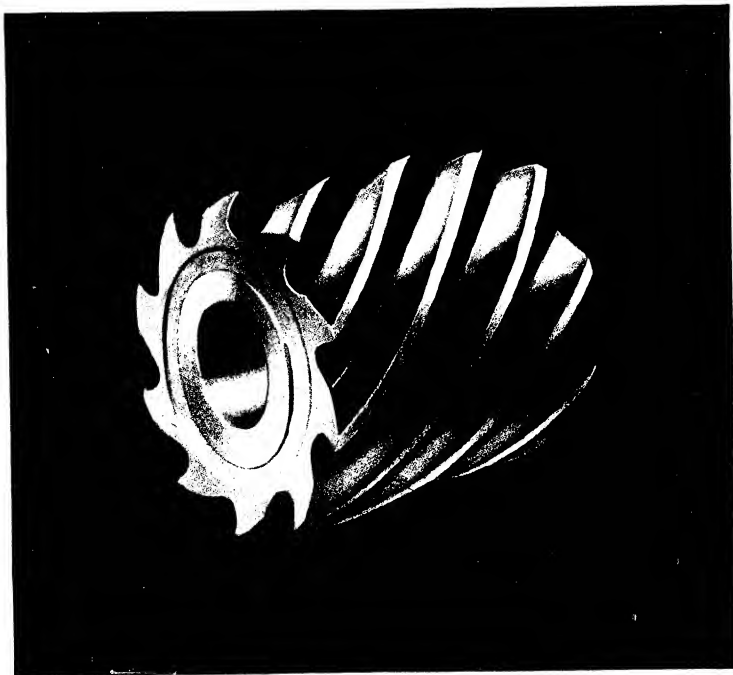
Page	Line	Printed	To be read
19	7 from top	... (Model N-59)...	... (Model M-59)...
23	15 " "	... the N-82 Grinder...	... the M-82 Grinder
31	4 from bottom	... Smolenskaja-Senneja pl.....	... Smolenskaja-Seunaja pl.....

Catalogue "Portable Electric Tools"

Vneshtozgizdat

Order No. 440

19



ФРЕЗЫ



ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ

СССР

МОСКВА

ФРЕЗЫ

MILLING CUTTERS

СТАНКОИМПОРТ

50X1-HUM



оставляемые В/О „Станкоимпорт“ фрезы изготовлены из лучших сортов стали с соответствующей термической обработкой,

что обеспечивает им отличную стойкость и позволяет работать на высоких скоростях резания и больших подачах.

Фрезы отвечают всем современным требованиям как в отношении геометрии режущих элементов, так и в отношении качества отделки режущих поверхностей инструмента.



The Milling Cutters furnished by V/O "Stankoimport" are manufactured of the best grades of steel and undergo suitable heat treatment.

This provides for long cutter life and permits work at high surface speeds and at heavy feeds.

Geometry of cutting elements and the finish on the cutting edges of the cutters meet all up-to-date requirements.

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ФРЕЗЫ ЦИЛИНДРИЧЕСКИЕ С МЕЛКИМ ЗУБОМ

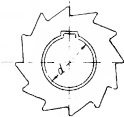
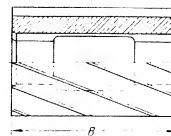
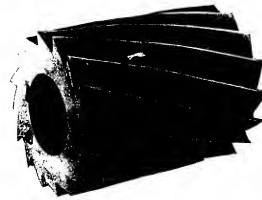
(по ГОСТ 3752-47)

PLAIN MILLING CUTTERS, LIGHT DUTY

(acc. to GOST 3752-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	d	B	Число зубьев Number of teeth	D	d	B	Число зубьев Number of teeth
40	16	25	12	60	27	75	16
40	16	30	12	60	27	100	16
40	16	40	12	75	32	50	18
40	16	50	12	75	32	60	18
40	16	60	12	75	32	75	18
50	22	30	14	75	32	100	18
50	22	40	14	75	32	125	18
50	22	50	14	90	40	60	20
50	22	60	14	90	40	75	20
50	22	75	14	90	40	100	20
60	27	40	16	90	40	125	20
60	27	50	16	90	40	150	20
60	27	60	16				

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия d и размеры ключевой канавки - по ГОСТ 4020-48.

2. Стандартные фрезы изготавливают с правой винтовой канавкой; фрезы с левой винтовой канавкой изготавливают только по специальному заказу.

3. Обозначение фрезы цилиндрической диаметром $D = 40$ мм и шириной $B = 60$ мм:

40 × 60 ГОСТ 3752-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Standard cutters have right-hand helix; cutters with left-hand helix are special.

3. Designation of a plain milling cutter, light duty, diameter $D = 40$ mm, face width $B = 60$ mm:

40 × 60 GOST 3752-47.

ФРЕЗЫ ЦИЛИНДРИЧЕСКИЕ СО ВСТАВНЫМИ НОЖАМИ (ОДИНАРНЫЕ)

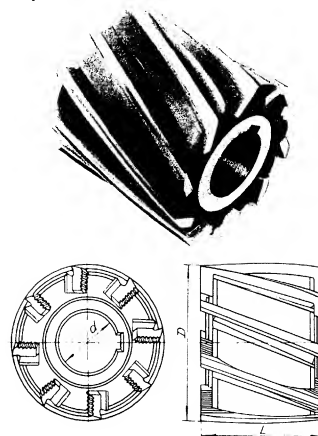
(по ГОСТ 1979-52)

INSERTED BLADE PLAIN MILLING CUTTERS

(acc. to GOST 1979-52)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm

D	L	d	Число ножей Number of blades	D	L	d	Число ножей Number of blades
75	60	27	8	90	100	32	8
75	75	27	8	110	60	40	10
90	60	32	8	110	75	40	10
90	75	32	8	110	100	40	10

СТАНКОИМПОРТ

СТАНКОИМПОРТ

D	L	d	Число ножей Number of blades	D	L	d	Число ножей Number of blades
110	125	40	8	150	60	60	12
130	60	50	10	150	75	60	12
130	75	50	10	150	100	60	12
130	100	50	10	150	125	60	10
130	125	50	8	150	150	60	10
130	150	50	8				

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Стандартные фрезы изготавлиют с правой винтовой канавкой; фрезы с левой винтовой канавкой изготавливают по специальному заказу. Фрезы выпускают с углом винтовой канавки 20° .

3. Конструкция фрез позволяет переключать ножи в левую или в правую сторону на требуемое количество рифлений; крепление ножей осуществляется клином.

4. Обозначение односторонней цилиндрической фрезы со вставными ножами диаметром $D = 75$ мм и шириной $L = 60$ мм:

Фреза А75 × 60 ГОСТ 1979-52.

По специальному заказу, отдельно от фрез, могут быть поставлены запасные ножи и клинья, размеры которых приведены ниже.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Standard cutters have right-hand helix; cutters with left-hand helix are special. Helix angle is 20° .

3. The serrated blade design of cutters permits a set-out of the blades in any desired number of serrations and makes blade adjustment more positive. Blades are held in the cutter body by wedges.

4. Designation of an inserted blade plain milling cutter, diameter $D = 75$ mm, face width $L = 60$ mm:

Cutter A75 × 60 GOST 1979-52.

On special order spare blades and wedges can be furnished separately. Dimensions of blades and wedges are given below.

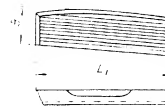
СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ

(по ГОСТ 1979-52)

SPARE BLADES

(acc. to GOST 1979-52)



Размеры в мм
Dimensions in mm

Диаметр и длина фрезы Diameter and face width of cutter	L_1	B	Диаметр и длина фрезы Diameter and face width of cutter	L_1	B
75 × 60	66,5	17	130 × 60	67	26
75 × 75	82,5	17,5	130 × 75	83	26
90 × 60	66,5	18,5	130 × 100	109,5	26,5
90 × 75	82,5	19	130 × 125	136,5	28
90 × 100	109	23,5	130 × 150	163	28
110 × 60	66,5	23,0	150 × 60	67	28
110 × 75	82,5	23,0	150 × 75	83	28
110 × 100	109,5	23,5	150 × 100	110	28
110 × 125	136	26	150 × 125	136,5	32
			150 × 150	163	32

Обозначение ножа для односторонней цилиндрической фрезы с диаметром $D = 75$ мм и шириной $L = 60$ мм:

Нож А75 × 60 ГОСТ 1979-52.

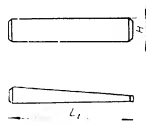
Designation of a blade for a plain milling cutter, diameter $D = 75$ mm, face width $L = 60$ mm:

Blade A75 × 60 GOST 1979-52.

СТАНКОИМПОРТ

ЗАПАСНЫЕ КЛИНЬЯ
(по ГОСТ 1979-52)

SPARE WEDGES
(acc. to GOST 1979-52)



Размеры в мм
Dimensions in mm

Диаметр и длина фрезы	H	L ₁	Диаметр и длина фрезы	H	L ₁
Diameter and face width of cutter			Diameter and face width of cutter		
75 × 60	10	50	130 × 60	18	50
75 × 75	10	63	130 × 75	16	63
90 × 60	12	50	130 × 100	16	90
90 × 75	12	63	130 × 125	14	115
90 × 100	12	90	130 × 150	12	140
110 × 60	14	50	150 × 60	18	50
110 × 75	14	63	150 × 75	18	63
110 × 100	13	90	150 × 125	18	115
110 × 125	13	115	150 × 150	18	140

Обозначение клина для односторонней цилиндрической фрезы — диаметр $D = 75$ мм и шириной $L = 60$ мм:

Клин А75 × 60 ГОСТ 1979-52.

Designation of a wedge for a plain milling cutter, diameter $D = 75$ mm, face width $L = 60$ mm:

Wedge A75 × 60 GOST 1979-52.

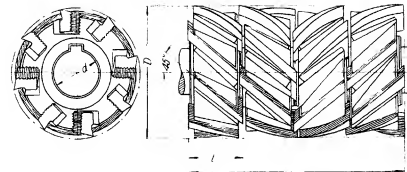
СТАНКОИМПОРТ

ФРЕЗЫ ЦИЛИНДРИЧЕСКИЕ СО ВСТАВНЫМИ НОЖАМИ
(СОСТАВНЫЕ)
(по ГОСТ 1979-52)

INSERTED BLADE MILLING CUTTER GANGS
(acc. to GOST 1979-52)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm

D	L	l	d	Число ножей Number of blades	Количество фрез в комплекте Number of cutters in gang	
					правых right-hand	левых left-hand
75	75	37,5	27	6	1	1
75	112,5	37,5	27	6	2	1
75	150	37,5	27	6	2	2
90	75	37,5	32	8	1	1
90	112,5	37,5	32	8	2	1
90	150	37,5	32	8	2	2
90	187,5	37,5	32	8	3	2

СТАНКОИМПОРТ

Продолжение
Continued

D	L	l	d	Число поверх Number of blades	Количество фрез в комплекте Number of cutters in gang	
					правых right-hand	левых left-hand
110	100	50	40	8	1	1
110	150	50	40	8	2	1
110	200	50	40	8	2	2
110	250	50	40	8	3	2
130	100	50	50	8	1	1
130	150	50	50	8	2	1
130	200	50	50	8	2	2
130	250	50	50	8	3	2
130	300	50	50	8	3	3
150	150	50	60	10	2	1
150	200	50	60	10	2	2
150	250	50	60	10	3	2
150	300	50	60	10	3	3
175	150	50	60	10	2	1
175	200	50	60	10	2	2
175	250	50	60	10	3	2
175	300	50	60	10	3	3
200	200	50	60	12	2	2
200	250	50	60	12	3	2
200	300	50	60	12	3	3

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Фрезы работают в комплекте и изготавливаются с правыми и левыми винтовыми канавками. Фрезы выпускают с углом винтовой канавки 45° . Конструкция фрез позволяет перемещать позы в пазу корпуса на требуемое количество рифлений. Крепление ножек осуществляется клином.

3. Обозначение одиночной правой фрезы — диаметром $D = 90$ мм и шириной $l = 37,5$ мм, входящей в комплект составной цилиндрической фрезы:

Фреза правая Б90 × 37,5 ГОСТ 1979-52;

то же, левой:

Фреза левая Б90 × 37,5 ГОСТ 1979-52;

то же, составной цилиндрической фрезы — диаметром $D = 90$ мм, длиной $L = 150$ мм и шириной $l = 37,5$ мм:

Фреза составная Б90 × 150 × 37,5 ГОСТ 1979-52.

По специальному заказу, отдельно от фрез, могут быть поставлены запасные ножки и клины, размеры которых приведены ниже.

СТАНКОИМПОРТ

1. Tolerance on diameter of bore d and dimensions of key way are according to GOST 4020-48.

2. Sections of cutter gang have either right- or left-hand helix, the angle of helix being 45° .

The serrated blade design of cutters permits setting out the blades in any desired number of serrations and makes blade adjustment more positive.

Blades are held in the cutter body by wedges.

3. Designation of a serrated blade right-hand cutter, diameter $D = 90$ mm, face width $l = 37,5$ mm for a cutter gang:

RH cutter Б 90 × 37,5 GOST 1979-52;

ditto for a left-hand cutter:

LH cutter Б 90 × 37,5 GOST 1979-52;

Designation of an inserted blade cutter gang, diameter $D = 90$ mm, gang width $L = 150$ mm and cutter face width $l = 37,5$ mm:

Cutter gang Б 90 × 150 × 37,5 GOST 1979-52.

On special order spare blades and wedges can be furnished separately. Dimensions of blades and wedges are given below.

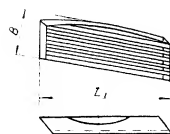
СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ

(по ГОСТ 1979-52)

SPARE BLADES

(acc. to GOST 1979-52)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	L_1	B
75	56	19
90	52,5	23
110	60	23
130	73,5	26
150	71	28,4
175	79	33,5
200	79	33,5

Обозначение правого ножа для одинарной цилиндрической фрезы диаметром $D = 75$ мм и шириной $l = 37,5$ мм:

Нож правый Б75 × 37,5 ГОСТ 1979-52;

то же, левого:

Нож левый Б75 × 37,5 ГОСТ 1979-52.

Designation of a right-hand blade for a sectional cutter diameter $D = 75$ mm, face width $l = 37,5$ mm:

RH blade Б 75 × 37,5 GOST 1979-52;

ditto for left-hand blade:

LH blade Б 75 × 37,5 GOST 1979-52.

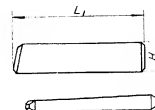
СТАНКОИМПОРТ

ЗАПАСНЫЕ КЛИНЬЯ

(по ГОСТ 1979-52)

SPARE WEDGES

(acc. to GOST 1979-52)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	L_1	H
75	38	8,5
90	38	9
110	53,5	9
130	53,5	12
150	53,5	14
175	53,5	19
200	53,5	19

Обозначение клина одинарной цилиндрической фрезы диаметром $D = 75$ мм, шириной $l = 37,5$ мм:

Клин Б75 × 37,5 ГОСТ 1979-52.

Designation of a wedge for a sectional milling cutter, diameter $D = 75$ mm, face width $l = 37,5$ mm:

Wedge Б 75 × 37,5 GOST 1979-52.

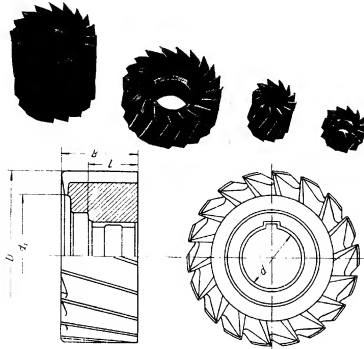
СТАНКОИМПОРТ

ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ С МЕЛКИМ ЗУБОМ
(по ГОСТ 3753-47)

LIGHT DUTY SHELL END MILLS
(acc. to GOST 3753-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	l	d_1	Число зубьев Number of teeth
40	20	16	12	24	12
40	40	16	30	24	12
50	25	22	15	32	14
50	50	22	38	32	14
60	30	27	18	40	16
60	60	27	48	40	16
75	35	27	22	40	18
75	75	27	62	40	18
90	35	32	20	50	20
110	35	32	20	50	22

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Стандартные фрезы готовят праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой готовят по специальному заказу.

3. Обозначение фрезы торцевой насадной с мелким зубом диаметром $D = 75$ мм и шириной $B = 35$ мм:

75 × 35 ГОСТ 3753-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Standard cutters are furnished in right-hand out, right-hand helix. Cutters with left-hand out or left-hand helix are special.

3. Designation of a light duty shell end mill, diameter $D = 75$ mm, face width $B = 35$ mm:

75 × 35 GOST 3753-47.

СТАНКОИМПОРТ

ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ С КРУПНЫМ ЗУБОМ

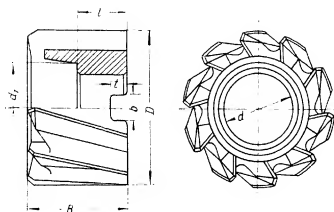
(по ГОСТ 3754-47)

HEAVY DUTY SHELL END MILLS

(acc. to GOST 3754-47)

Материал: быстрорежущая или легированная сталь.

Material: high speed steel or alloy steel.

Размеры в мм
Dimensions in mm

D	B	d	l	d ₁	b	t	Число зубьев Number of teeth
60	40	27	20	35	10	6,5	10
75	45	32	20	42	12	7,5	10

1. Допуск на диаметр посадочного отверстия d — по ГОСТ 4020-48.
2. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.
3. Обозначение фрезы торцевой насадной с крупным зубом диаметром $D = 60$ мм и шириной $B = 40$ мм:
60 × 40 ГОСТ 3754-47.

1. Tolerances on diameter of bore d are according to GOST 4020-48.
2. Standard cutters are furnished in right-hand cut, right-hand helix. Cutters with left-hand cut or left-hand helix are special.
3. Designation of a heavy duty shell end mill, diameter $D = 60$ mm, face width $B = 40$ mm:
60 × 40 GOST 3754-47.

СТАНКОИМПОРТ

ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ СО ВСТАВНЫМИ НОЖАМИ

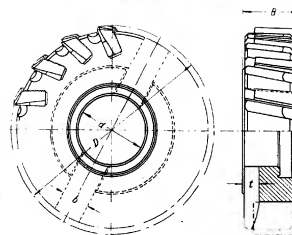
(по ГОСТ 1092-52)

INSERTED BLADE FACE MILLING CUTTERS

(acc. to GOST 1092-52)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.

Размеры в мм
Dimensions in mm

D	B	d	t	b	Число ножей Number of blades
75	36	27	6,5	10	10
90	39	32	7,5	12	10

СТАНКОИМПОРТ

Продолжение
Continued

<i>D</i>	<i>B</i>	<i>d</i>	<i>t</i>	<i>b</i>	Число ножей Number of blades
110	41	40	10	16	12
130	41	40	10	16	14
150	45	50	12	20	16
175	45	50	12	20	18
200	45	50	12	20	20
225	45	50	12	20	22

1. Допуск на диаметр посадочного отверстия *d* — по ГОСТ 4020-68.
2. Стандартные фрезы изготавливают праворежущими. Фрезы леворежущие изготавливают по специальному заказу.
3. Конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество рифлений. Крепление ножей осуществляется запрессовкой клиновидных ножей с рифлеными пазы корпуса фрезы.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи, размеры которых приведены ниже.

1. Tolerances on diameter of bore *d* are according to GOST 4020-48.
 2. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.
 3. The serrated blade design of cutters permits setting out the blades in any desired number of serrations and makes blade adjustment more positive. Blades are locked by pressing them into the slots of cutter body.
- On special order spare blades can be furnished separately. Dimensions of blades are given below.

СТАНКОИМПОРТ

НОЖИ КЛИНОВИДНЫЕ РИФЛЕННЫЕ (запасные)

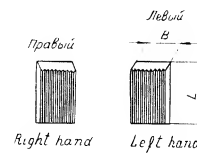
(по ГОСТ 6214-52)

WEDGE TYPE SERRATED BLADES (spare)

(acc. to GOST 6214-52)

Материал: быстрорежущая сталь.

Material: high speed steel.

Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	<i>L</i>	<i>B</i>	Обозначение ножа Designation of blade
75	28,3	15	3-15
90	28,3	18,5	3-18,5
110	28,3	22,5	3-22,5
130	28,3	22,5	3-22,5
150	33,8	25,5	4-25,5
175	33,8	25,5	4-25,5
200	33,8	25,5	4-25,5
225	33,8	25,5	4-25,5

1. Для корпусов праворежущих фрез применяют левые ножи, для корпусов леворежущих фрез — правые ножи.

2. Обозначение правого ножа с размерами *L* = 28,3 мм и *B* = 15 мм:

Нож 3-15 ГОСТ 6214-52;

то же, левый:

Нож Л 3-15 ГОСТ 6214-52.

1. Left-hand blades are used for right-hand cutters and right-hand blades — for left-hand cutters.

2. Designation of a right-hand blade, *L* = 28,3 mm, *B* = 15 mm:

Blade 3-15 GOST 6214-52;

ditto for a left-hand blade:

LH Blade 3-15 GOST 6214-52.

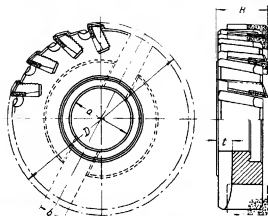
СТАНКОИМПОРТ

**ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ СО ВСТАВНЫМИ
НОЖАМИ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ**
(по нормам завода-изготовителя)

**CARBIDE TIPPED INSERTED BLADE FACE MILLING
CUTTERS, SHELL TYPE**
(acc. to Maker's Standard)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок
ТК для обработки стали и вольфрам-
кобальтовые сплавы марок ВК для обра-
ботки чугуна.

Material of tips: TK tungsten-titanium carbide for machining
steel and BK tungsten carbide for machining
cast iron.



СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

D	B	d	b	t	Число ножей Number of blades
75	34	27	10	6,5	10
90	37	32	12	7,5	10
110	39	40	16	10	12
130	39	40	16	10	12
150	41	50	20	12	14
175	41	50	20	12	16
200	41	50	20	12	16
225	41	50	20	12	18

1. Допуск на диаметр посадочного отверстия d — по ГОСТ 4020-48.
2. Стандартные фрезы изготовляют праворежущими. Фрезы леворежущие изготовляют по специальному заказу.
3. Для полного использования пластинок твердого сплава конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество рифлений.
4. Обозначение торцевой насадной праворежущей фрезы со вставными ножками, оснащенной твердым сплавом BK8 диаметром $D = 150$ мм:

Фреза торцевая насадная 150 BK8 нормаль завода.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи, размеры которых приведены ниже.

1. Tolerances on diameter of bore d are according to GOST 4020-48.
2. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

3. The serrated blade design of cutters permits setting out the blades in any desired number of serrations, thus giving maximum life of carbide tips. Blades are locked by pressing them into the slots of cutter body.

4. Designation of a right-hand cut inserted blade shell type facing cutter tipped with BK8 carbide, diameter $D = 150$ mm:

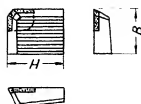
Facing cutter 150 BK8 Maker's Standard.

On special order spare blades can be furnished separately. Dimensions of spare blades are given below.

СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ
(по нормам завода-изготовителя)

SPARE BLADES
(acc. to Maker's Standard)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	H	B	Обозначение ножа Designation of blade
75	28,8	14,5	T1
90	28,8	18,5	T2
110	28,8	22,5	T3
130	28,8	22,5	T3
150	33,8	24,5	T4
175	33,8	24,5	T4
200	33,8	24,5	T4
225	33,8	24,5	T4

Обозначение ножа правого, оснащенного твердым сплавом BKS с размерами $H = 28,8$ мм и $B = 22,5$ мм:

Нож T3 BKS нормаль завода;
то же, левого:

Нож T3 BKS нормаль завода.

Designation of a right-hand blade tipped with BK 8 carbide,
 $H = 28,8$ mm, $B = 22,5$ mm:

Blade T3 BK 8 Maker's Standard;

ditto for a left-hand blade:

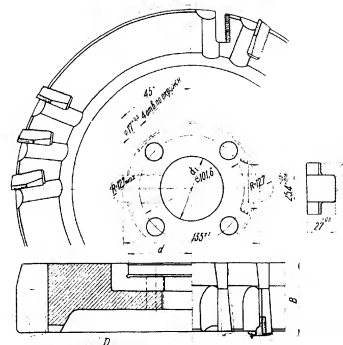
LH Blade T3 BK 8 Maker's Standard.

СТАНКОИМПОРТ

**ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ СО ВСТАВНЫМИ
НОЖАМИ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ**
(по нормам завода-изготовителя)

**CARBIDE TIPPED INSERTED BLADE FACE MILLING CUTTERS,
SHELL TYPE**
(acc. to Maker's Standard)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок
TK для обработки стали и вольфрам-кобаль-
товые сплавы марок BK для обработки чугуна.
Material of tips: TK tungsten-titanium carbide for machining steel
and BK tungsten carbide for machining cast iron.



СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

<i>D</i>	<i>B</i>	<i>d</i>	<i>d</i> ₁	Число ложей Number of blades
250	59	128,57	60	20
275	59	128,57	60	20
300	64	128,57	60	22
325	64	128,57	60	24
350	64	128,57	60	24
375	64	128,57	60	26
400	64	128,57	60	28
450	64	128,57	60	30
500	69	128,57	60	32
550	69	128,57	60	34
600	69	128,57	60	36

1. Стандартные фрезы изготовляют праворежущими. Фрезы леворежущие изготовляют по специальному заказу.

2. Для полного использования пластинок твердого сплава конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество rifлений. Крепление ножей осуществляется запрессовкой клиновидных ножей с rifлениями в корпус фрезы.

3. Обозначение торцевой насадной праворежущей фрезы со вставными ножками, оснащенными пластинками твердого сплава BK8 диаметром $D = 300$ мм:

Фреза торцевая насадная 300 BK8 нормаль завода.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи, размеры которых приведены ниже.

1. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

2. The serrated blade design permits setting out the blades in any desired number of serrations, thus giving maximum life of carbide tips. Blades are locked by pressing them into the slots of cutter body.

3. Designation of a right-hand cut inserted blade facing cutter tipped with BK8 carbide, diameter $D = 300$ mm:

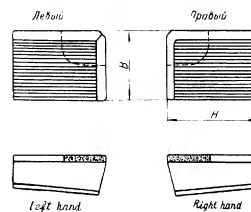
Facing cutter 300 BK8 Maker's Standard.

On special order spare blades can be furnished separately. Dimensions of spare blades are given below.

СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ (по нормам завода-изготовителя)

SPARE BLADES (acc. to Maker's Standard)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	<i>H</i>	<i>B</i>	Обозначение ножа Designation of blade
250	40,8	27,3	ТЗД
275	40,8	27,3	ТЗД
300	45,8	31,3	Т4Д
325	45,8	31,3	Т4Д
350	45,8	31,3	Т4Д
375	45,8	31,3	Т4Д
400	45,8	31,3	Т4Д
450	45,8	31,3	Т4Д
500	50,8	39,3	Т5Д
550	50,8	39,3	Т5Д
600	50,8	39,3	Т5Д

Обозначение ножа правого, оснащенного твердым сплавом BK8 с размерами $H = 45,8$ мм и $B = 31,3$ мм:

Нож Т4Д BK8 нормаль завода;

то же, левого:

Нож ЛТ4Д BK8 нормаль завода.

Designation of a right-hand blade tipped with BK8 carbide, $H = 45,8$ mm, $B = 31,3$ mm:

Blade T4D BK8 Maker's Standard;

ditto for a left-hand blade:

LH Blade T4D BK8 Maker's Standard.

СТАНКОИМПОРТ

**ФРЕЗЫ ТОРЦЕВЫЕ НАСАДНЫЕ СО ВСТАВНЫМИ
НОЖАМИ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ**

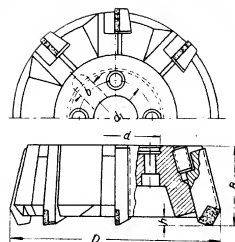
(по ГОСТ 3879-52)

**CARBIDE TIPPED INSERTED BLADE FACE MILLING CUTTERS,
SHELL TYPE**

(acc. to GOST 3879-52)

Материал пластинок: вольфрам-титано-кобальтовый сплав
марки ТК.

Material of tips: TK tungsten-titanium carbide.



СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

D	B	h	d	d_1	b	Число лопаток Number of blades
150	56	6	69,832	54	15,888	6
200	72	7	88,88	66,7	13,888	8
250	72	7	128,57	101,6	25,415	8
320	72	7	128,57	101,6	25,415	10
400	97	17	128,57	101,6	25,415	12

1. Фрезы предназначены для обработки стальных деталей на высоких режимах резания.

2. Для полного использования пластинок твердого сплава конструкция фрез позволяет перемещать ножи в пазу корпуса фрезы. Крепление ножей в корпусе осуществляется клиньями, а точная установка их по высоте — установочными винтами.

3. Обозначение торцевой насадной фрезы диаметром $D = 200$ мм:
Фреза 200 ГОСТ 3879-52.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи и клинья, размеры которых приведены ниже.

1. Cutters are designed for cutting steel at high surface speeds.

2. The cutter design permits moving the blades in the slots of cutter body, thus giving maximum life of carbide tips. The blades are held in the slots by wedges and adjusted in height by setting screws.

3. Designation of a shell type face milling cutter, diameter $D = 200$ mm:
Cutter 200 GOST 3879-52.

On special order spare blades and wedges can be furnished separately. Dimensions of spare blades and wedges are given below.

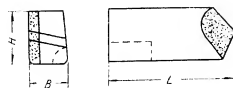
СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ

(по ГОСТ 3879-52)

SPARE BLADES

(acc. to GOST 3879-52)

Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	Обозначение размера ножа Designation of blade size	B	H	L
150	1	13	20	54
200	2	16	22	70
250	2	16	22	70
320	2	16	22	70
400	3	18	32	95

Обозначение ножа для фрез диаметром 200 — 320 мм:

Нож 2 ГОСТ 3879-52.

Designation of a blade for cutters 200 — 320 mm diameter:

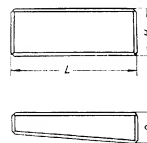
Blade 2 GOST 3879-52.

СТАНКОИМПОРТ**ЗАПАСНЫЕ КЛИНЬЯ**

(по ГОСТ 3879-52)

SPARE WEDGES

(acc. to GOST 3879-52)

Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	Обозначение размера клина Designation of wedge size	H	L	B
150	1	19	42	10,6
200	2	21	54	13
250	2	21	54	13
320	2	21	54	13
400	3	31	68	15,6

Обозначение клина для фрез диаметром 200 — 320 мм:

Клин 2 ГОСТ 3879-52.

Designation of a wedge for cutters 200 — 300 mm diameter:

Wedge 2 GOST 3879-52.

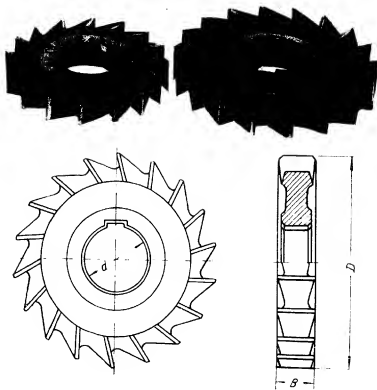
СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ТРЕХСТОРОННИЕ С МЕЛКИМ ЗУБОМ
(по ГОСТ 3755-47)

SIDE MILLING CUTTERS, LIGHT DUTY
(acc. to GOST 3755-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

<i>D</i>	<i>B</i>	<i>d</i>	Число зубьев Number of teeth	<i>D</i>	<i>B</i>	<i>d</i>	Число зубьев Number of teeth
60	6	22	16	90	10	27	20
60	8	22	16	90	12	27	20
60	10	22	16	90	14	27	20
60	12	22	16	90	16	27	20
75	8	22	18	110	12	27	22
75	10	22	18	110	14	27	22
75	12	22	18	110	16	27	22
75	14	22	18				

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия *d* и размеры шпоночной канавки - по ГОСТ 4020-48.

2. Обозначение фрезы дисковой трехсторонней, диаметром *D* = 60 мм и шириной *B* = 8 мм:

60 × 8 ГОСТ 3755-47.

1. Tolerance on diameter of bore *d* and dimensions of keyway are according to GOST 4020-48.

2. Designation of a side milling cutter, diameter *D* = 60 mm, face width *B* = 8 mm:

60 × 8 GOST 3755-47.

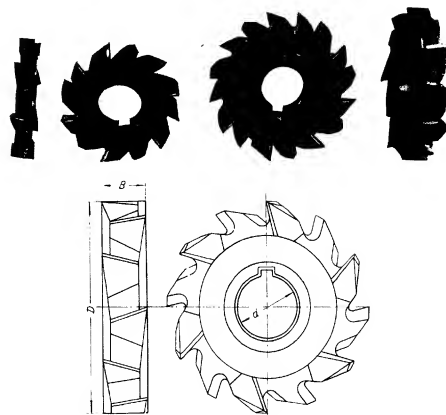
СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ТРЕХСТОРОННИЕ С РАСКОШЕННЫМ ЗУБОМ

(по ведомственной норме ВП 333-47)

STAGGERED TOOTH SIDE MILLING CUTTERS (acc. to Maker's Standard BH 333-47)

Материал: быстрорежущая сталь.
Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число зубьев (минимальное) Minimum number of teeth	D	B	d	Число зубьев (минимальное) Minimum number of teeth
60	6	22	10	60	10	22	10
60	8	22	10	60	12	22	10

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	Число зубьев (минимальное) Minimum number of teeth	D	B	d	Число зубьев (минимальное) Minimum number of teeth
75	6	22	12	90	10	27	12
75	8	22	12	90	12	27	12
75	10	22	12	90	14	27	12
75	12	22	12	90	16	27	12
75	14	22	12	90	18	27	12
75	16	22	12	90	20	27	12
90	8	27	12				

1. Для обеспечения легкой и спокойной работы фрезы имеют попеременно-скошенные в разные стороны по отношению к оси фрезы зубья.

2. Допуск на диаметр посадочного отверстия d и размеры лопастной канавки - по ГОСТ 4020-48.

3. Обозначение дисковой трехсторонней фрезы с раскошенным зубом диаметром $D = 60$ мм и шириной $B = 10$ мм:

90 × 10 ВП 333-47.

1. For free and smooth cutting these cutters have teeth at alternate right- and left-hand helix angles.

2. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

3. Designation of a staggered tooth side milling cutter diameter $D = 60$ mm, face width $B = 10$ mm:

90 × 10 ВП 333-47.

СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ТРЕХСТОРОННИЕ С ВПРЕССОВАННЫМИ НОЖАМИ

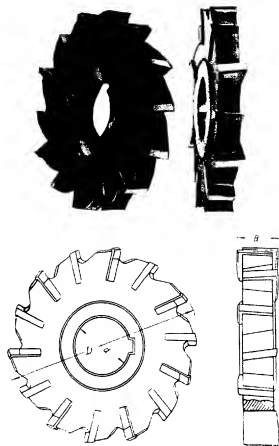
(по нормам завода-изготовителя)

INSERTED BLADE SIDE MILLING CUTTERS

(acc. to Maker's Standard)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число ножей Number of blades	D	B	d	Число ножей Number of blades
90	12	27	10	90	16	27	10
90	14	27	10	90	18	27	10

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	Число ножей Number of blades	D	B	d	Число ножей Number of blades
90	20	27	10	150	30	40	18
90	22	27	10	150	32	40	18
90	24	27	10	150	34	40	18
110	12	27	14	175	12	40	22
110	14	27	14	175	14	40	22
110	16	27	14	175	16	40	22
110	18	27	14	175	18	40	22
110	20	27	14	175	20	40	22
110	22	27	14	175	22	40	22
110	24	27	14	175	24	40	22
110	26	27	14	175	26	40	22
110	28	27	14	175	28	40	22
130	12	32	16	175	30	40	22
130	14	32	16	175	32	40	22
130	16	32	16	175	34	40	22
130	18	32	16	200	12	50	24
130	20	32	16	200	14	50	24
130	22	32	16	200	16	50	24
130	24	32	16	200	18	50	24
130	26	32	16	200	20	50	24
130	28	32	16	200	22	50	24
150	12	40	18	200	24	50	24
150	14	40	18	200	26	50	24
150	16	40	18	200	28	50	24
150	18	40	18	200	30	50	24
150	20	40	18	200	32	50	24
150	22	40	18	200	34	50	24
150	24	40	18	200	36	50	24
150	26	40	18	200	40	50	24
150	28	40	18				

1. Фрезы предназначены для фрезерования пазов и поверхностей и могут быть использованы как отдельно, так и комплектами, а также в сочетании с цилиндрическими и угловыми фрезами в самых различных наборах.

2. Для обеспечения легкой и сложной работы фрезы имеют попеременно-скошенные в разные стороны по отношению к оси фрезы зубья, работающие каждой с одной стороны.

3. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-68.

4. Обозначение дисковой трехсторонней фрезы с впрессованными ножами диаметром $D = 90$ мм и шириной $B = 20$ мм:

Трехсторонняя фреза с впрессованными ножами
 90×20 нормаль завода.

СТАНКОИМПОРТ

1. These cutters are designed for slotting work and general surface milling and can be used as a single cutter, in sets, or combined with plain cylindrical or angle milling cutters.

2. For free and smooth cutting these cutters have teeth at alternate right- and left-hand helix angles.

2. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

4. Designation of an inserted blade side milling cutter, diameter $D = 90$ mm, face width $B = 20$ mm:

Inserted blade side cutter 90 x 20 Maker's Standard.

ФРЕЗЫ ДИСКОВЫЕ ТРЕХСТОРОННИЕ СО ВСТАВНЫМИ НОЖАМИ

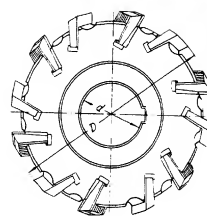
(по ГОСТ 1669-52)

INSERTED BLADE SIDE MILLING CUTTERS

(acc. to GOST 1669-52)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число ножей Number of blades	D	B	d	Число ножей Number of blades
75	12	22	10	75	20	22	10
75	14	22	10	75	22	22	10
75	16	22	10	75	24	22	10
75	18	22	10	90	12	27	12

СТАНКОИМПОРТ

СТАНКОИМПОРТ

Продолжение
Continued

<i>D</i>	<i>B</i>	<i>d</i>	Число нозей Number of blades	<i>D</i>	<i>B</i>	<i>d</i>	Число нозей Number of blades
90	14	27	12	175	28	40	16
90	16	27	12	175	30	40	16
90	18	27	12	175	32	40	16
90	20	27	12	175	34	40	16
90	22	27	12	200	12	50	22
90	24	27	12	200	14	50	22
110	12	27	14	200	16	50	20
110	14	27	14	200	18	50	20
110	16	27	14	200	20	50	20
110	18	27	14	200	22	50	20
110	20	27	12	200	24	50	20
110	22	27	12	200	26	50	20
110	24	27	12	200	28	50	18
110	26	27	12	200	30	50	18
110	28	27	12	200	32	50	18
130	12	32	16	200	34	50	18
130	14	32	16	200	36	50	16
130	16	32	16	200	40	50	16
130	18	32	16	225	12	50	24
130	20	32	12	225	14	50	24
130	22	32	12	225	16	50	22
130	24	32	12	225	18	50	22
130	26	32	12	225	20	50	22
130	28	32	12	225	22	50	22
150	12	40	18	225	24	50	22
150	14	40	18	225	26	50	22
150	16	40	16	225	28	50	20
150	18	40	16	225	30	50	20
150	20	40	16	225	32	50	20
150	22	40	16	225	34	50	20
150	24	40	16	225	36	50	18
150	26	40	16	225	40	50	18
150	28	40	14	250	16	50	24
150	30	40	14	250	18	50	24
150	32	40	14	250	20	50	24
150	34	40	14	250	22	50	24
175	12	40	20	250	24	50	24
175	14	40	20	250	26	50	24
175	16	40	18	250	28	50	22
175	18	40	18	250	30	50	22
175	20	40	18	250	32	50	22
175	22	40	18	250	34	50	22
175	24	40	18	250	36	50	20
175	26	40	18	250	40	50	20

1. Допуск на диаметр посадочного отверстия *d* и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество рифлений. Крепление ножей осуществляется запрессовкой клиновидных ножей с рифлениями в корпус фрезы.

СТАНКОИМПОРТ

Для обеспечения легкой и спокойной работы фрезы имеют поочередно-скошенность в разные стороны по отношению к оси фрезы зубья, работающие каждый с одной стороны.

3. Обозначение трехсторонней фрезы со вставными ножами диаметром *D* = 90 мм и шириной *B* = 20 мм:

Фреза 90 × 20 ГОСТ 1669-52.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи, размеры которых приведены ниже.

1. Tolerance on diameter of bore *d* and dimensions of keyway are according to GOST 4020-48.

2. The cutter design permits moving the blades in any desired number of serrations.

Blades are locked by pressing them into the slots of cutter body.

For free and smooth cutting these cutters have teeth at alternate right- and left-hand helix angles. Each tooth cuts from one side only.

3. Designation of an inserted blade side milling cutter, diameter *D* = 90 mm, face width *B* = 20 mm:

Cutter 90 × 20 GOST 1669-52.

On special order spare blades can be furnished separately. Dimensions of spare blades are given below.

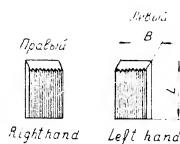
СТАНКОИМПОРТ

НОЖИ КЛИНОВИДНЫЕ РИФЛЕННЫЕ (запасные)
(по ГОСТ 6214-52)

WEDGE TYPE SERRATED BLADES (spare)
(acc. to GOST 6214-52)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

Размеры фрезы Dimensions of cutter			L	B	Обозначение ножа Designation of blade	Размеры фрезы Dimensions of cutter			L	B	Обозначение ножа Designation of blade
Диаметр Diameter	Ширина Width					Диаметр Diameter	Ширина Width				
75	12	16,8	11	1-11	110	20	28,3	18,5	3-18,5		
75	14	16,8	13	1-13	110	22	28,3	18,5	3-18,5		
75	16	16,8	15	1-15	110	24	28,3	22,5	3-22,5		
75	18	16,8	15	1-15	110	26	28,3	22,5	3-22,5		
75	20	16,8	18,5	1-18,5	110	28	28,3	26,5	3-26,5		
75	22	16,8	18,5	1-18,5	130	12	23,8	11	2-11		
75	24	16,8	22,5	1-22,5	130	14	23,8	13	2-13		
90	12	16,8	11	1-11	130	16	23,8	15	2-15		
90	14	16,8	13	1-13	130	18	23,8	15	2-15		
90	16	16,8	15	1-15	130	20	28,3	18,5	3-18,5		
90	18	16,8	15	1-15	130	22	28,3	18,5	3-18,5		
90	20	16,8	18,5	1-18,5	130	24	28,3	22,5	3-22,5		
90	22	16,8	18,5	1-18,5	130	26	28,3	22,5	3-22,5		
90	24	16,8	22,5	1-22,5	130	28	28,3	26,5	3-26,5		
110	12	23,8	11	2-11	150	12	23,8	11	2-11		
110	14	23,8	13	2-13	150	14	23,8	13	2-13		
110	16	23,8	15	2-15	150	16	28,3	15	3-15		
110	18	23,8	15	2-15	150	18	28,3	15	3-15		

СТАНКОИМПОРТ

Продолжение
Continued

Размеры фрезы Dimensions of cutter			L	B	Обозначение ножа Designation of blade	Размеры фрезы Dimensions of cutter			L	B	Обозначение ножа Designation of blade
Диаметр Diameter	Ширина Width					Диаметр Diameter	Ширина Width				
150	20	28,3	18,5	3-18,5	200	32	28,3	28,5	3-28,5		
150	22	28,3	18,5	3-18,5	200	34	28,3	28,5	3-28,5		
150	24	28,3	22,5	3-22,5	200	36	33,8	32,5	4-32,5		
150	26	28,3	22,5	3-22,5	200	40	33,8	32,5	4-32,5		
150	28	28,3	26,5	3-26,5	225	12	23,8	11	2-11		
150	30	28,3	26,5	3-26,5	225	14	23,8	13	2-13		
150	32	28,3	28,5	3-28,5	225	16	28,3	15	3-15		
150	34	28,3	28,5	3-28,5	225	18	28,3	15	3-15		
175	12	23,8	11	2-11	225	20	28,3	18,5	3-18,5		
175	14	23,8	13	2-13	225	22	28,3	18,5	3-18,5		
175	16	28,3	15	3-15	225	24	28,3	22,5	3-22,5		
175	18	28,3	15	3-15	225	26	28,3	22,5	3-22,5		
175	20	28,3	18,5	3-18,5	225	28	28,3	26,5	3-26,5		
175	22	28,3	18,5	3-18,5	225	30	28,3	26,5	3-26,5		
175	24	28,3	22,5	3-22,5	225	32	28,3	28,5	3-28,5		
175	26	28,3	22,5	3-22,5	225	34	28,3	28,5	3-28,5		
175	28	28,3	26,5	3-26,5	225	36	33,8	32,5	4-32,5		
175	30	28,3	26,5	3-26,5	225	40	33,8	32,5	4-32,5		
175	32	28,3	28,5	3-28,5	250	16	28,3	15	3-15		
175	34	28,3	28,5	3-28,5	250	18	28,3	15	3-15		
200	12	23,8	11	2-11	250	20	28,3	18,5	3-18,5		
200	14	23,8	13	2-13	250	22	28,3	18,5	3-18,5		
200	16	28,3	15	3-15	250	24	28,3	22,5	3-22,5		
200	18	28,3	15	3-15	250	26	28,3	22,5	3-22,5		
200	20	28,3	18,5	3-18,5	250	28	28,3	26,5	3-26,5		
200	22	28,3	18,5	3-18,5	250	30	28,3	26,5	3-26,5		
200	24	28,3	22,5	3-22,5	250	32	28,3	28,5	3-28,5		
200	26	28,3	22,5	3-22,5	250	34	28,3	28,5	3-28,5		
200	28	28,3	26,5	3-26,5	250	36	33,8	32,5	4-32,5		
200	30	28,3	26,5	3-26,5	250	40	33,8	32,5	4-32,5		

Обозначение правого ножа с размерами $L = 16,8$ мм и $B = 11$ мм:

Нож 1-11 ГОСТ 6214-52;

то же, левого:

Нож 11-11 ГОСТ 6214-52.

Designation of a right-hand blade, $L = 16,8$ mm, $B = 11$ mm:

Blade 1-11 GOST 6214-52.

Same for left-hand blade:

L 11 GOST 6214-52.

СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ТРЕХСТОРОННИЕ СО ВСТАВНЫМИ НОЖАМИ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ

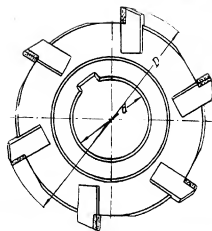
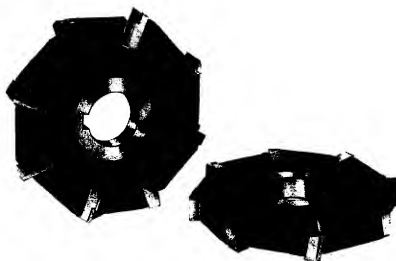
(по ГОСТ 5348-50)

CARBIDE TIPPED INSERTED BLADE SIDE MILLING CUTTERS

(acc. to GOST 5348-50)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок
TK для обработки стали и вольфрам-кобаль-
товые сплавы марок BK для обработки чугуна.

Material of tips: TK tungsten-titanium carbide for machining
steel and BK tungsten carbide for machining
cast iron.



-8-

СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

D	B	d	Количество ножей (ми- нимальное) Number of blades (minimum)	D	B	d	Количество ножей (ми- нимальное) Number of blades (minimum)
90	10	32	6	175	22	50	10
90	12	32	6	175	24	50	10
90	14	32	6	175	26	50	10
90	16	32	6	200	14	60	10
90	18	32	6	200	16	60	10
90	20	32	6	200	18	60	10
90	22	32	6	200	20	60	10
90	24	32	6	200	22	60	10
90	26	32	6	200	24	60	10
110	10	40	6	200	26	60	10
110	12	40	6	200	30	60	10
110	14	40	6	225	14	60	14
110	16	40	6	225	16	60	14
110	18	40	6	225	18	60	14
110	20	40	6	225	20	60	14
110	22	40	6	225	22	60	14
110	24	40	6	225	24	60	14
110	26	40	6	225	26	60	14
130	12	40	8	225	30	60	14
130	14	40	8	250	14	60	16
130	16	40	8	250	16	60	16
130	18	40	8	250	18	60	16
130	20	40	8	250	20	60	16
130	22	40	8	250	22	60	16
130	24	40	8	250	24	60	16
130	26	40	8	250	26	60	16
150	12	50	8	250	30	60	16
150	14	50	8	300	18	60	18
150	16	50	8	300	20	60	18
150	18	50	8	300	22	60	18
150	20	50	8	300	24	60	18
150	22	50	8	300	26	60	18
150	24	50	8	300	30	60	18
150	26	50	8	350	18	60	20
175	12	50	10	350	20	60	20
175	14	50	10	350	22	60	20
175	16	50	10	350	24	60	20
175	18	50	10	350	26	60	20
175	20	50	10	350	30	60	20

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Для лучшего использования пластинок твердого сплава конструкция фрезы позволяет перемещать ножи в пазу корпуса на требуе-

СТАНКОИМПОРТ

мое количество рифлений; крепление ножей осуществляется при помощи клиньев.

3. Для обеспечения легкой и спокойной работы фрезы имеют поочередно-скошенные в разные стороны по отношению к оси фрезы зубья, работающие каждый с одной стороны.

4. Фрезы могут работать отдельно или в комплекте.

5. Обозначение трехсторонней фрезы, диаметром $D = 110$ мм и шириной $B = 14$ мм со вставными ножами, оснащенными твердым сплавом T15K6:

Фреза 110 × 14 T15K6 ГОСТ 5348-50.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. The serrated blade design permits moving the blades in the slots of cutter body in any desired number of serrations, thus giving maximum life of carbide tips. The blades are locked by means of wedges.

3. For free and smooth cutting the cutters have teeth at alternate right- and left-hand helix angles. Each tooth cuts from one side only.

4. Cutters can work either single or in sets.

5. Designation of an inserted blade side milling cutter tipped with T15K6 carbide, diameter $D = 110$ mm, face width $B = 14$ mm:

Cutter 110 × 14 T15K6 GOST 5348-50.

СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ДВУХСТОРОННИЕ СО ВСТАВНЫМИ НОЖАМИ

(по нормам завода-изготовителя)

INSERTED BLADE HALF SIDE MILLING CUTTERS

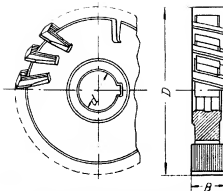
(acc. to Maker's Standard)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm



D	B	d	Число ножей Number of blades
75	22	22	12
90	22	27	14
110	25	27	12
130	26	32	16
150	26	40	16
175	26	40	18
200	26	50	20
225	32	50	20
250	32	50	22

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки -- по ГОСТ 4020-48.
2. Фрезы изготовляют праворульными и леворульными.
3. Конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество рифлений. Крепление ножей осуществляется запрессовкой клиновидных ножей с рифлениями в корпус фрезы.
4. Обозначение дисковой двухсторонней праворульной фрезы со вставными ножами диаметром $D = 90$ мм:

Фреза двухсторонняя 90 нормаль завода;
то же, леворульная:

Фреза двухсторонняя Л 90 нормаль завода.

По специальному заказу, отдельно от фрез, могут быть поставлены запасные ножи, размеры которых приведены ниже.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.
2. Cutters are furnished right- or left-hand cut.
3. The cutter design permits moving the blades in any desired number of serrations. Blades are locked by pressing them into the slots of cutter body.
4. Designation of an inserted blade right-hand out half side milling cutter, diameter $D = 90$ mm:

Half side cutter 90 Maker's Standard;

ditto for a left-hand cutter:

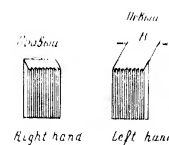
LH half side cutter 90 Maker's Standard.

On special order spare blades can be furnished separately. Dimensions of blades are given below.

НОЖИ КЛИНОВИДНЫЕ РИФЛЕННЫЕ (вставные)

WEDGE TYPE SERRATED BLADES

(spare)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	L	B	Обозначение ножа Designation of blade
75—90	16,8	22,5	1-22,5
110—130	23,8	26,5	A-28
150—200	28,3	26,5	3-26,5
225—250	33,8	32,5	4-32,5

Обозначение правого ножа с размерами $L = 16,8$ мм и $B = 22,5$ мм:
Нож к двухсторонней фрезе 1-22,5 нормаль завода.

Designation of a right-hand blade $L = 16,8$ mm, $B = 22,5$ mm:
Blade for half side cutter 1-22,5 Maker's Standard.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ДВУХСТОРОННИЕ СО ВСТАВНЫМИ НОЖАМИ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ

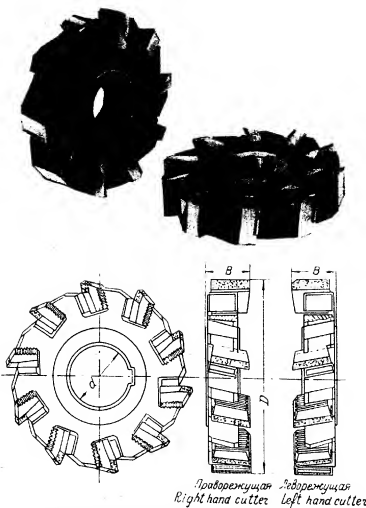
(по ГОСТ 6469-53)

CARBIDE TIPPED INSERTED BLADE HALF SIDE MILLING CUTTERS

(acc. to GOST 6469-53)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок
TK для обработки стали и вольфрам-кобаль-
товые сплавы марок BK для обработки чугуна.

Material of tips: TK tungsten-titanium carbide for machining
steel and BK tungsten carbide for machining
cast iron.



СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

D	B	d	Число ножей Number of blades
90	16	32	8
110	18	40	8
130	22	40	10
150	26	50	10
175	26	50	12
200	30	60	12
225	30	60	14
250	30	60	16
300	30	60	18
350	30	60	20

1. Допуск на диаметр посадочного отверстия d и размеры шпоноч-
ной канавки — по ГОСТ 4020-48.

2. Фрезы изготавливают праворежущими и леворежущими.

3. По специальному заказу фрезы могут быть изготовлены с диа-
метром посадочного отверстия d :

для фрез диаметром $D = 90$ и 110 мм ... $d = 27$ мм.

для фрез диаметром $D = 130$ мм ... $d = 32$ мм.

для фрез диаметром $D = 150$ и 175 мм ... $d = 40$ мм.

для фрез диаметром $D = 200 - 300$ мм ... $d = 50$ мм.

4. Для полного использования пластинок твердого сплава кон-
струкция этих фрез позволяет перемещать ножи в пазу корпуса на
требуемое количество rifлений.

Ножи крепятся при помощи клиньев.

5. Обозначение праворежущей дисковой двухсторонней фрезы с
размерами $D = 90$ мм и $d = 32$ мм со вставными ножами, оснащен-
ными твердым сплавом T15K6:

Фреза 90 T15K6 ГОСТ 6469-53;

то же, леворежущей:

Фреза Л 90 T15K6 ГОСТ 6469-53.

По специальному заказу могут быть поставлены отдельно от фрез
запасные ножи и клинья, размеры которых приведены ниже.

СТАНКОИМПОРТ

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Cutters are furnished right- or left-hand cut.

3. On special order cutters can be furnished with the following diameter of bore d :

for cutters of $D = 90$ and 110 mm ... $d = 27$ mm,
for cutters of $D = 130$ mm ... $d = 32$ mm,
for cutters of $D = 150$ and 175 mm ... $d = 40$ mm,
for cutters of $D = 200$ — 300 mm ... $d = 50$ mm.

4. The cutter design permits moving the blades in the slots of cutter body in any desired number of serrations, thus giving maximum life of carbide tips. The blades are locked by means of wedges.

5. Designation of an inserted blade right-hand cut half side milling cutter tipped with T15K6 carbide, diameter $D = 90$ mm, bore diameter $d = 32$ mm:

Cutter 90 T15K6 GOST 6469-53;

ditto for a left-hand cutter:

LH cutter 90 T15K6 GOST 6469-53.

On special order spare blades and wedges can be furnished separately. Dimensions of blades and wedges are given below.

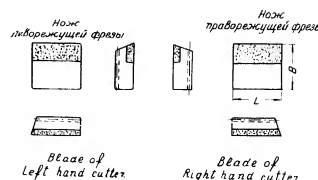
СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ

(по ГОСТ 6469-53)

SPARE BLADES

(acc. to GOST 6469-53)



Размеры в мм
Dimensions in mm

Диаметр Фрезы Diameter of cutter	L	B
90	16	18
110	16	22
130	20	27
150—175	24	27
200—350	26	29

Обозначение ножа с размерами $L = 16$ мм и $B = 18$ мм для праворежущей фрезы диаметром $D = 90$ мм, оснащенной твердым сплавом T15K6:

Нож 16×18 T15K6 ГОСТ 6469-53;

то же, леворежущей:

Нож Л 16×18 T15K6 ГОСТ 6469-53.

Designation of a blade $L = 16$ mm, $B = 18$ mm for a right-hand cutter diameter $D = 90$ mm tipped with T15K6 carbide:

Blade 16×18 T15K6 GOST 6469-53;

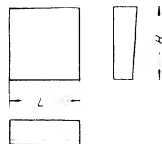
ditto for a left-hand cutter:

LH Blade 16×18 T15K6 GOST 6469-53.

СТАНКОИМПОРТ

ЗАПАСНЫЕ КЛИНЬЯ (по ГОСТ 6469-53)

SPARE WEDGES
(acc. to GOST 6469-53)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of cutter	L	H
90	10	10
110	14	13
130	16	17
150—175	20	17
200—350	24	17

Обозначение клина с размерами $L = 10$ мм и $H = 10$ мм для фрезы диаметром $D = 90$ мм:

Клин 10 × 10 ГОСТ 6469-53.

Designation of a wedge $L = 10$ mm, $H = 10$ mm for a cutter of diameter $D = 90$ mm:

Wedge 10 × 10 GOST 6469-53.

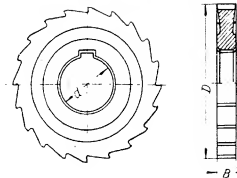
СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ПАЗОВЫЕ (по ГОСТ 3964-47)

SLOTING MILLING CUTTERS
(acc. to GOST 3964-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число зубьев Number of teeth	D	B	d	Число зубьев Number of teeth
60	5	22	20	75	10	22	22
60	6	22	20	75	12	22	22
60	7	22	20	90	10	27	24
60	8	22	20	90	12	27	24
75	7	22	22	90	14	27	24
75	8	22	22	90	16	27	24

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Обозначение фрезы пазовой диаметром $D = 75$ мм и шириной $B = 7$ мм:

60 × 7 ГОСТ 3964-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Designation of a slotting milling cutter, diameter $D = 75$, face width $B = 7$ mm:

60 × 7 GOST 3964-47.

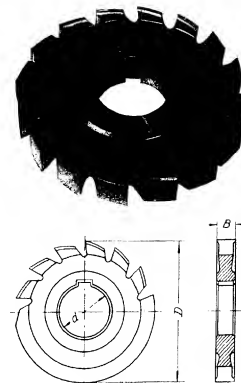
СТАНКОИМПОРТ

ФРЕЗЫ ДИСКОВЫЕ ПАЗОВЫЕ ЗАТЫЛОВАННЫЕ (по ГОСТ 20194-40)

RELIEVED TEETH SLOTTING MILLING CUTTERS (acc. to OST 20194-40)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число зубьев Number of teeth	D	B	d	Число зубьев Number of teeth
50	4	16	14	75	8	22	14
50	5	16	14	75	10	22	14
50	6	16	14	75	12	22	14
60	5	22	14	90	10	27	16
60	6	22	14	90	12	27	16
60	7	22	14	90	14	27	16
60	8	22	14	90	16	27	16
75	7	22	14				

СТАНКОИМПОРТ

1. Допуск на диаметр посадочного отверстия d и размеры пазовой канавки — по ГОСТ 4020-48.

2. Обозначение фрезы пазовой заточенной диаметром $D = 60$ мм и шириной $B = 10$ мм:
60 × 10 ОСТ 20194-40.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Designation of a relieved teeth slotting milling cutter, diameter $D = 60$ mm, face width $B = 10$ mm:
60 × 10 OST 20194-40.

СТАНКОИМПОРТ

ФРЕЗЫ ОДНОУГЛОВЫЕ

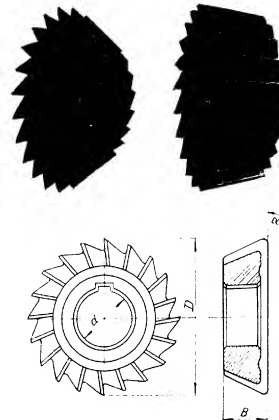
(по ГОСТ 3960-47)

SINGLE ANGLE MILLING CUTTERS

(acc. to GOST 3960-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	α	Число зубьев Number of teeth	D	B	d	α	Число зубьев Number of teeth
35	8	13	60°	18	35	10	13	75°	18
35	10	13	65°	18	35	10	13	80°	18
35	10	13	70°	18	35	10	13	85°	18

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	α	Число зубьев Number of teeth	D	B	d	α	Число зубьев Number of teeth
35	10	13	90°	18	60	16	22	55°	22
45	13	16	55°	20	60	16	22	60°	22
45	13	16	60°	20	60	16	22	65°	22
45	13	16	65°	20	60	16	22	70°	22
45	13	16	70°	20	60	20	22	75°	22
45	13	16	75°	20	60	20	22	80°	22
45	13	16	80°	20	60	20	22	85°	22
45	13	16	85°	20	60	20	22	90°	22
45	13	16	90°	20					

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Стандартные фрезы изготовляют праворежущими. Леворежущие фрезы изготовляют по специальному заказу.

3. Обозначение фрезы одноугловой праворежущей диаметром $D = 60$ мм с углом $\alpha = 80^\circ$:

60 × 80° ГОСТ 3960-47;

то же, леворежущей:

Л60 × 80° ГОСТ 3960-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

3. Designation of a right-hand single angle milling cutter, diameter $D = 60$ mm and angle $\alpha = 80^\circ$:

60 × 80° GOST 3960-47;

ditto for a left-hand cutter:

LH 60 × 80° GOST 3960-47.

СТАНКОИМПОРТ

ФРЕЗЫ ДВУХУГЛОВЫЕ НЕСИММЕТРИЧНЫЕ

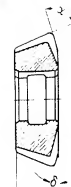
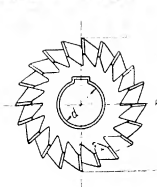
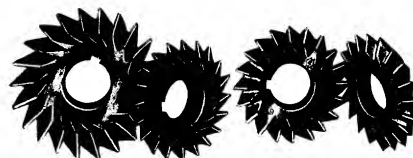
(по ГОСТ 3961-47)

DOUBLE ANGLE MILLING CUTTERS WITH UNSYMMETRICAL
TOOTH FACE

(acc. to GOST 3961-47)

Материал: быстрорежущая сталь.

Material: high speed steel.

Размеры в мм
Dimensions in mm

D	B	d	α	δ	Число зубьев Number of teeth
35	6	13	55°	15°	18
35	6	13	60°	15°	18
35	6	13	65°	15°	18
35	8	13	70°	15°	18
35	8	13	75°	15°	18
35	10	13	80°	15°	18
35	10	13	85°	15°	18
35	10	13	90°	20°	18
35	13	13	100°	25°	18
45	8	16	55°	15°	20

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	α	δ	Число зубьев Number of teeth
45	8	16	60°	15°	20
45	8	16	65°	15°	20
45	10	16	70°	15°	20
45	10	16	75°	15°	20
45	13	16	80°	15°	20
45	13	16	85°	15°	20
45	16	16	90°	20°	20
45	16	16	100°	25°	20
60	10	22	55°	15°	20
60	10	22	60°	15°	20
60	10	22	65°	15°	20
60	13	22	70°	15°	20
60	13	22	75°	15°	20
60	16	22	80°	15°	20
60	16	22	85°	15°	20
60	16	22	90°	20°	20
60	16	22	100°	25°	20
75	13	22	50°	15°	22
75	13	22	55°	15°	22
75	16	22	60°	15°	22
75	16	22	65°	15°	22
75	20	22	70°	15°	22
75	20	22	75°	15°	22
75	20	22	80°	15°	22
75	24	22	85°	15°	22
75	24	22	90°	20°	22
90	20	27	50°	15°	24
90	20	27	55°	15°	24
90	24	27	60°	15°	24
90	24	27	65°	15°	24
90	30	27	70°	15°	24
90	30	27	75°	15°	24
90	30	27	80°	15°	24

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

2. Стандартные фрезы изготавливают праворежущими. Леворежущие фрезы изготавливают по специальному заказу.

3. Обозначение фрезы двухугловой несимметричной, диаметром $D = 60$ мм с углом $\alpha = 85^\circ$:

$60 \times 85^\circ$ ГОСТ 3961-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

3. Designation of a double angle milling cutter with unsymmetrical tooth face, diameter $D = 60$ mm and angle $\alpha = 85^\circ$:

$60 \times 85^\circ$ GOST 3961-47.

СТАНКОИМПОРТ

ФРЕЗЫ ПОЛУКРУГЛЫЕ ВЫПУКЛЫЕ

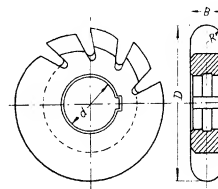
(по ГОСТ 3962-47)

RADIAL TOOTH FACE CONVEX MILLING CUTTERS

(acc. to GOST 3962-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

R	D	B	d	Число зубьев Number of teeth
1,5	45	3	16	18
2	45	4	16	18
2,5	55	5	22	16
3	55	6	22	14
4	60	8	22	14
5	60	10	22	12
6	65	12	22	12
7	65	14	22	12
8	75	16	27	10
9	80	18	27	10
10	85	20	27	10
12	90	24	27	10

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

СТАНКОИМПОРТ

2. По специальному заказу фрезы для глубокого фрезерования изготавливают с боковыми выточками.

3. Обозначение фрезы полукруглой выпуклой, радиусом $R = 8$ мм:
8 ГОСТ 3962-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. On special order cutters for deep cuts are furnished with recessed sides.

3. Designation of a radial tooth face convex milling cutter, radius $R = 8$ mm:

8 ГОСТ 3962-47.

ФРЕЗЫ ПОЛУКРУГЛЫЕ ВОГНУТЫЕ

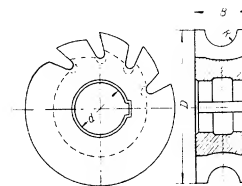
(по ГОСТ 3963-47)

RADIAL TOOTH FACE CONCAVE MILLING CUTTERS

(acc. to GOST 3963-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

R	D	B	d	Число зубьев Number of teeth
1,5	45	7	16	18
2	45	8	16	18
2,5	55	10	22	16
3	55	12	22	14
4	60	15	22	14
5	60	18	22	12
6	65	20	22	12
7	65	24	22	12
8	75	26	27	10
9	80	30	27	10
10	85	34	27	10
12	90	38	27	10

1. Допуск на диаметр посадочного отверстия d и размеры шпоночной канавки — по ГОСТ 4020-48.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

2. По специальному заказу фрезы для глубокого фрезерования изготовляют с боковыми выточками.

3. Обозначение фрезы полукруглой вогнутой, радиусом $R = 8$ мм:
8 ГОСТ 3963-47.

1. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

2. On special order cutters for deep cuts are furnished with recessed sides.

3. Designation of a radial tooth face concave milling cutter, radius $R = 8$ mm:

8 ГОСТ 3963-47.

СТАНКОИМПОРТ

ФРЕЗЫ ПРОРЕЗНЫЕ

(по ГОСТ 2680-44)

SCREW-SLOTTING CUTTERS

(acc. to GOST 2680-44)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число зубьев фрез Number of teeth	
			с мелким зубом fine-tooth cutters	с крупным зубом coarse- tooth cutters
40	0,2	13	108	72
40	0,3	13	108	60
40	0,4	13	90	60
40	0,5	13	90	50
40	0,6	13	90	50
40	0,8	13	72	40
40	1,0	13	72	40
60	0,5	16	120	72
60	0,6	16	108	72
60	0,8	16	108	60
60	1,0	16	90	60
60	1,2	16	90	60

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	Число зубьев фрез Number of teeth	
			с мелким зубом fine-tooth cutters	с крупным зубом coarse- tooth cutters
60	1,5	16	90	50
60	2,0	16	72	50
75	1,0	22	108	72
75	1,2	22	108	60
75	1,5	22	108	60
75	2,0	22	90	60
75	2,5	22	72	60
75	3,0	22	72	50
75	4,0	22	72	50
75	5,0	22	—	50

1. Фрезы с мелким зубом предназначены для прорезания неглубоких пазов, расклевки тонких изделий и тонкостенных труб. Фрезы с крупным зубом предназначены для прорезания глубоких пазов.

2. Фрезы со шпоночной канавкой изготавливают по специальному заказу.

3. Размеры шпоночной канавки и допуск на диаметр d посадочного отверстия — по ГОСТ 4020-48.

4. Обозначение прорезной фрезы диаметром $D = 40$ мм, шириной $B = 1$ мм с числом зубьев $Z = 40$:

40 × 1 × 40 ГОСТ 2680-44.

1. Fine-tooth cutters are designed for slotting screw heads, slitting thin-wall tubes and for various operations where a shallow slot is needed. Coarse-tooth cutters are designed for cutting deep slots.

2. Cutters with keyway are special.

3. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

4. Designation of a screw-slotting cutter, diameter $D = 40$ mm, width $B = 1$ mm, number of teeth $Z = 40$:

40 × 1 × 40 GOST 2680-44.

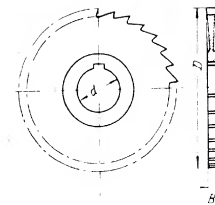
СТАНКОИМПОРТ

ФРЕЗЫ ОТРЕЗНЫЕ
(по ГОСТ 2679-44)

METAL SLITTING SAWS
(acc. to GOST 2679-44)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	B	d	Число зубьев Number of teeth	D	B	d	Число зубьев Number of teeth
60	1	16	36	75	1,5	22	36
60	1,5	16	30	75	2	22	36
60	2	16	30	75	2,5	22	30
60	2,5	16	30	75	3	22	30
75	1	22	36	110	1,5	27	50

СТАНКОИМПОРТ

Продолжение
Continued

D	B	d	Число зубьев Number of teeth	D	B	d	Число зубьев Number of teeth
110	2	27	50	150	3,5	32	50
110	2,5	27	40	150	4	32	50
110	3	27	40	200	3	32	60
110	3,5	27	40	200	3,5	32	60
150	2	32	60	200	4	32	50
150	2,5	32	60	200	5	32	50
150	3	32	50				

1. У фрез шириной до 2 мм шипоочный паз изготовляют по специальному заказу.

2. Допуск на диаметр посадочного отверстия d и размеры шипоочной канавки — по ГОСТ 4020-48.

3. Обозначение отрезной фрезы диаметром $D = 60$ мм, шириной $B = 2,5$ мм с числом зубьев $Z = 30$:

$60 \times 2,5 \times 30$ ГОСТ 2679-44.

1. Saws up to 2 mm width are made without a keyway. Saws of these sizes may be furnished with a keyway on special order.

2. Tolerance on diameter of bore d and dimensions of keyway are according to GOST 4020-48.

3. Designation of a metal slitting saw, diameter $D = 60$ mm, width $B = 2,5$ mm, number of teeth $Z = 30$:

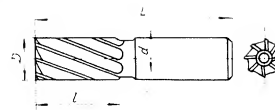
$60 \times 2,5 \times 30$ GOST 2679-44.

СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
(по ГОСТ 3958-47)STRAIGHT SHANK END MILLS
(acc. to GOST 3958-47)

Материал: быстрорежущая сталь.

Material: high speed steel.

Размеры в мм
Dimensions in mm

D	d	L	l	Число зубьев Number of teeth
3	4	35	8	4
4	4	40	11	4
5	6	45	14	6
6	6	50	16	6
8	8	55	18	6
10	10	60	20	6
12	12	70	25	8
14	16	75	30	8
16	16	85	35	8
18	20	90	40	8
20	20	100	45	8

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой.

Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Фрезы диаметром 3 и 4 мм изготовляются без торцевого зуба.

3. Фрезы диаметром до 6 мм могут быть изготовлены с обратным центром со стороны хвостовика.

4. Обозначение концевой фрезы с цилиндрическим хвостом диаметром $D = 20$ мм:

20 ГОСТ 3958-47.

1. Standard end mills are furnished in right-hand cut, right-hand helix.

Mills with left-hand cut or left-hand helix are special.

2. End mills 3 and 4 mm diameter are furnished without face teeth.

3. End mills up to 6 mm diameter may be furnished with external center on shank.

4. Designation of a straight shank end mill, diameter $D = 20$ mm:

20 GOST 3958-47.

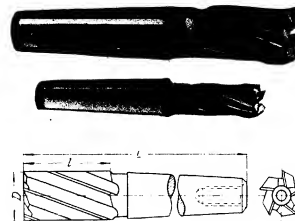
СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ С КОНИЧЕСКИМ ХВОСТОМ (по ГОСТ 3959-47)

TAPER SHANK END MILLS (acc. to GOST 3959-47)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	L	l	№ конуса Морзе Morse taper No.	Число зубьев Number of teeth
14	115	32	2	5
16	120	36	2	5
18	120	36	2	5
20	145	44	3	5
22	145	44	3	5
25	150	48	3	5
28	175	50	4	6
30	180	55	4	6
35	185	60	4	6
40	190	65	4	6
45	195	70	4	6
45	225	70	5	6
50	195	70	4	6
50	225	70	5	6

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Размеры конусов Морзе --- по ГОСТ 2847-45.

3. Обозначение фрезы концевой с коническим хвостом диаметром $D = 18$ мм:

18 ГОСТ 3959-47.

1. Standard end mills are furnished in right-hand cut, right-hand helix. Mills with left-hand cut or left-hand helix are special.

2. For Morse taper sizes see GOST 2847-45.

3. Designation of a taper shank end mill, diameter $D = 18$ mm:

18 GOST 3959-47.

СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ С КОНИЧЕСКИМ ХВОСТОМ, БЕЗ ТОРЦЕВЫХ ЗУБЬЕВ

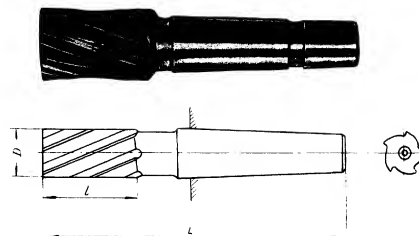
(по нормам ВП 323-51)

TAPER SHANK END MILLS WITHOUT FACE TEETH

(acc. to Standard BH 323-51)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

Фрезы короткие Short series			Фрезы длинные Long series		№ конуса Морзе Morse taper No.	Число зубьев Number of teeth
D	L	l	L	l		
14	115	32	130	48	2	5
16	120	36	135	52	2	5
18	120	36	140	56	2	5
20	145	44	165	65	3	5
22	145	44	165	65	3	5
25	150	48	185	72	3	5
28	175	50	205	80	4	6
30	180	55	210	85	4	6
35	185	60	220	95	4	6
40	190	65	225	100	4	6
45	225	70	255	110	5	6
50	225	70	270	115	5	6

СТАНКОИМПОРТ

1. Нормальные фрезы изготавливают с левыми винтовыми канавками.
2. Размеры конусов Морзе — по ГОСТ 2847-45.
3. Обозначение фрезы концевой короткой, диаметром $D = 18$ мм с конусом Морзе № 2:

18 Морзе 2 кор. ВН 323-51;

то же, длиной фрезы:

18 Морзе 2 длин. ВН 323-51.

1. Standard cutters are furnished in left-hand helix.
2. For Morse taper sizes see GOST 2847-45.
3. Designation of a short end mill, diameter $D = 18$ mm and Morse taper No. 2:

18 Morse 2 short BH 323-51;

ditto for a long mill:

18 Morse 2 long BH 323-51.

СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ ОБДИРОЧНЫЕ С КОНИЧЕСКИМ ХВОСТОМ, С ЗАТЫЛОВАННЫМ ЗУБОМ

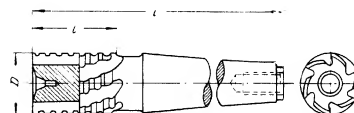
(по ГОСТ 4675-49)

TAPER SHANK END MILLS WITH RELIEVED TEETH

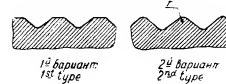
(acc. to GOST 4675-49)

Материал: быстрорежущая сталь.

Material: high speed steel.



Профиль стружкоразделительных канавок
Profile of chip dividing grooves



СТАНКОИМПОРТ

Размеры в мм
Dimensions in mm

D	L	l	Число зубьев Number of teeth	№ конуса Морзе Morse taper No.
25	150	48	5	3
25	185	82	5	3
25	215	112	5	3
30	180	55	5	4
30	210	85	5	4
30	245	120	5	4
35	185	60	5	4
35	220	95	5	4
35	255	130	5	4
40	190	65	6	4
40	225	100	6	4
40	265	140	6	4
45	225	70	6	5
45	270	115	6	5
45	315	160	6	5
50	225	70	6	5
50	270	115	6	5
50	315	160	6	5
60	235	80	8	5
60	315	160	8	5
60	355	200	8	5

1. Фрезы могут быть изготовлены с торцевыми зубьями и без них.
2. Фрезы изготовляют праворежущими, с направлением винтовых канавок: левым — для фрез без торцевых зубьев и правым — для фрез с торцевыми зубьями.

Леворежущие фрезы изготовляют по специальному заказу. При этом направление винтовых канавок изменяется.

3. Фрезы снабжены стружко-разделительными канавками с затупленным профилем, которые смещены одна относительно другой.

4. Обозначение концевой фрезы диаметром 45 мм и длиной 270 мм, без торцевых зубьев, с профилем стружко-разделительных канавок, выполненных по первому варианту:

45 × 270-1 ГОСТ 4675-49;

то же, с торцевыми зубьями:

45 × 270-1 с торцевыми зубьями ГОСТ 4675-49.

СТАНКОИМПОРТ

1. End mills can be furnished either with or without face teeth.
2. Standard end mills without face teeth are furnished in right-hand cut, left-hand helix. Mills with face teeth are furnished in right-hand cut, right-hand helix.

Mills with left-hand cut are special, the direction of hand of helix being changed.

3. Cutters are furnished with relieved profile chip dividing grooves displaced in respect to each other.

4. Designation of a relieved tooth taper shank end mill with type No. 1 chip dividing groove, diameter 45 mm, length 270 mm:

45 × 270-1 GOST 4675-49;

same mill with face teeth:

45 × 270-1 with face teeth GOST 4675-49.

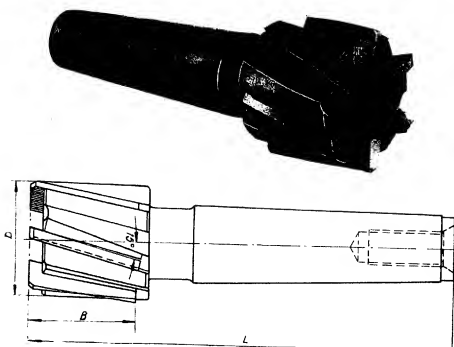
СТАНКОИМПОРТ

**ФРЕЗЫ КОНЦЕВЫЕ ТОРЦЕВЫЕ
СО ВСТАВНЫМИ НОЖАМИ**
(по нормам завода-изготовителя)

INSERTED BLADE END MILLS
(acc. to Maker's Standard)

Материал ножей: быстрорежущая сталь.

Material of blades: high speed steel.



Размеры в мм
Dimensions in mm

D	L	B	Число ножей Number of blades	№ конуса Морзе Morse taper No.
40	140	35	5	3
45	170	45	6	4
50	175	50	6	4
60	225	55	8	5

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Размеры конусов Морзе — по ГОСТ 2847-45.

3. Конструкция фрез позволяет перемещать ножи в пазу корпуса на требуемое количество rifлений.

Крепление ножей в корпусе фрезы осуществляется при помощи клиньев.

4. Обозначение фрезы концевой торцевой со вставными ножами диаметром $D = 50$ мм, праворежущей:

Фреза концевая со вставными ножами 50 нормаль завода.

По специальному заказу, отдельно от фрез могут быть поставлены запасные ножи и клинья, размеры которых приведены ниже.

1. Standard mills are furnished in right-hand cut, right-hand helix. Mills with left-hand cut or left-hand helix are special.

2. For Morse taper sizes see GOST 2847-45.

3. The cutter design permits moving the blades in the slots of cutter body in a desired number of serrations.

The blades are locked by means of wedges.

4. Designation of a right-hand inserted blade end mill, diameter $D = 50$ mm:

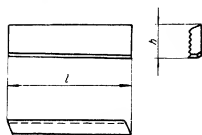
Inserted blade mill 50 Maker's Standard.

On special order spare blades and wedges can be furnished separately. Dimensions of spare blades and wedges are given below.

СТАНКОИМПОРТ

ЗАПАСНЫЕ НОЖИ
(по нормам завода-изготовителя)

SPARE BLADES
(acc. to Maker's Standard)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of mill	l	h
40	37	13,5
45	48	13,5
50	53	14,5
60	58	15,5

Обозначение ножа правого с размерами $l = 37$ мм и $h = 13,5$ мм:

Нож к концевой торцевой фрезе диам. 40 нормаль завода.

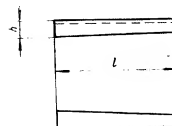
Designation of a right-hand blade $l = 37$ mm, $h = 13,5$ mm:

Blade for end mill diam. 40 Maker's Standard.

СТАНКОИМПОРТ

ЗАПАСНЫЕ КЛИНЬЯ
(по нормам завода-изготовителя)

SPARE WEDGES
(acc. to Maker's Standard)



Размеры в мм
Dimensions in mm

Диаметр фрезы Diameter of mill	l	h
40	32	8
45	42	7,5
50	48	8
60	53	8,5

Обозначение клина размерами $l = 32$ мм и $h = 8$ мм:

Клин к концевой торцевой фрезе диам. 40 нормаль завода.

Designation of a wedge $l = 32$ mm, $h = 8$ mm:

Wedge for end mill diam. 40 Maker's Standard.

СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ ТОРЦЕВЫЕ С КОНИЧЕСКИМ ХВОСТОМ, ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ

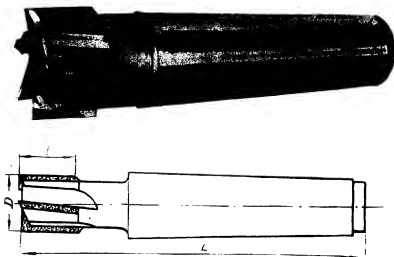
(по нормам завода-изготовителя)

CARBIDE TIPPED TAPER SHANK END MILLS

(acc. to Maker's Standard)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок ТК для обработки стали и вольфрам-кобальтовые сплавы марок ВК для обработки чугуна.

Material of tips: TK tungsten-titanium carbide for machining steel and BK tungsten carbide for machining cast iron.



Размеры в мм
Dimensions in mm

D	L	l	Число зубьев Number of teeth	№ конуса Морзе Morse taper No.
12	90	15	4	1
14	105	15	4	2
16	105	15	4	2
18	105	20	5	2

СТАНКОИМПОРТ

Продолжение
Continued

D	L	l	Число зубьев Number of teeth	№ конуса Морзе Morse taper No.
20	125	20	5	3
22	125	20	5	3
25	125	20	5	3
28	150	20	5	4
30	150	20	6	4
35	150	25	6	4
40	150	25	6	4
45	190	30	6	5
50	190	30	6	5

1. Фрезы выпускают праворежущими. Фрезы леворежущие изготавливают по особому заказу.

2. Размеры конусов Морзе -- по ГОСТ 2847-45.

3. Обозначение торцевой концевой фрезы с коническим хвостом, оснащенной твердым сплавом Т15К6 диаметром $D = 30$ мм:

Торцевая фреза с коническим хвостом 30 Т15К6 нормаль завода.

1. Standard end mills are right-hand cut. Mills with left-hand cut are special.

2. For Morse taper sizes see GOST 2847-45.

3. Designation of a taper shank end mill tipped with T15K6 carbide, diameter $D = 30$:

Taper shank end mill 30 T15K6 Maker's Standard.

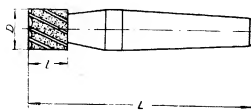
СТАНКОИМПОРТ

ФРЕЗЫ КОНЦЕВЫЕ С КОРОНКАМИ ИЗ ТВЕРДОГО СПЛАВА
(по нормам завода-изготовителя)

END MILLS WITH CARBIDE CROWN
(acc. to Maker's Standard)

Материал коронки: вольфрам-титано-кобальтовые сплавы марок ТК для обработки стали и вольфрам-кобальтовые сплавы марок ВК для обработки чугуна.

Material of crown: TK tungsten-titanium carbide for machining steel and BK tungsten carbide for machining cast iron.



Размеры в мм
Dimensions in mm

D	L	l	Число зубьев Number of teeth	№ конуса Морзе Morse taper No.
14	142	14	6	3
18	142	16	8	3
22	142	17	8	3

СТАНКОИМПОРТ

1. Нормальные фрезы изготовляют праворежущими с правой винтовой канавкой.

2. Конуса Морзе выполняются по ГОСТ 2847-45.

3. Обозначение фрезы концевой с коронкой из твердого сплава марки Т15К6 диаметром 18 мм:

Фреза с коронкой 18 Т15К6 нормаль завода.

1. Standard mills are furnished in right-hand cut, right-hand helix.

2. For Morse taper sizes see GOST 2847-45.

3. Designation of an end mill with T15K6 carbide crown, diameter 18mm:
Crown end mill 18 T15K6 Maker's Standard.

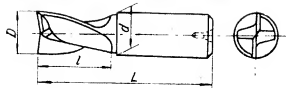
СТАНКОИМПОРТ

ФРЕЗЫ ШПОНОЧНЫЕ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
(по ГОСТ НКТП 3942)

TWO-LIPPED SLOTTING END MILLS WITH STRAIGHT SHANK
(acc. to OST NKTP 3942)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	d	L	l	D	d	L	l
3	4	30	6	12	12	60	18
4	4	30	6	14	16	65	21
5	6	35	8	16	16	70	24
6	6	40	9	18	20	75	28
8	8	45	12	20	20	85	32
10	10	50	14				

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Фрезы диаметром до 6 мм могут быть изготовлены с обратным центром со стороны хвостовика.

3. Обозначение фрезы шпоночной с цилиндрическим хвостом диаметром $D = 10$ мм:

10 OST НКТП 3942.

1. Standard mills are furnished in right-hand cut, right-hand helix. Mills with left-hand cut or left-hand helix are special.

2. Mills up to 6 mm diameter may be furnished with external center on shank.

3. Designation of a straight shank slotting end mill, diameter $D = 10$ mm:

10 OST NKTP 3942.

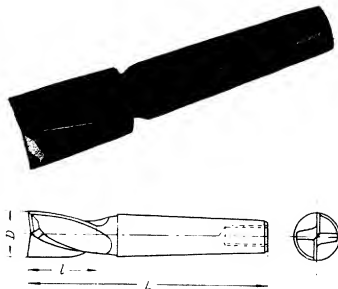
СТАНКОИМПОРТ

ФРЕЗЫ ШПОНОЧНЫЕ С КОНИЧЕСКИМ ХВОСТОМ
(по ГОСТ НКТП 3943)

TWO-LIPPED SLOTTING END MILLS WITH TAPER SHANK
(acc. to OST NKTP 3943)

Материал: быстрорежущая сталь.

Material: high speed steel.



Размеры в мм
Dimensions in mm

D	L	l	№ конуса Морзе Morse taper No.
16	100	24	2
18	105	26	2
20	110	32	2
24	130	35	3
28	140	44	3
32	145	48	3
36	175	55	4
40	180	60	4

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Размеры конусов Морзе — по ГОСТ 2847-45.

3. Обозначение фрезы шпоночной с коническим хвостом диаметром $D = 20$ мм:

20 OST NKTP 3943.

1. Standard mills are furnished in right-hand cut, right-hand helix. Mills with left-hand cut or left-hand helix are special.

2. For Morse taper sizes see GOST 2847-45.

3. Designation of a taper shank slotting end mill, diameter $D = 20$ mm:

20 OST NKTP 3943.

СТАНКОИМПОРТ

**ФРЕЗЫ ШПОНОЧНЫЕ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ,
ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ**

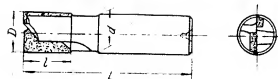
(по ГОСТ 6396-52)

**TWO-LIPPED CARBIDE TIPPED SLOTTING END MILLS WITH
STRAIGHT SHANK**

(acc. to GOST 6396-52)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок ТК для обработки стали и вольфрам-кобальтовые сплавы марок БК для обработки чугуна.

Material of tips: TK tungsten-titanium carbide for machining steel and BK tungsten carbide for machining cast iron.



Размеры в мм
Dimensions in mm

D	L	d	l
8	45	8	12
10	50	10	12
12	60	12	15
14	65	14	20
16	70	16	20

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими. Фрезы леворежущие изготовляют по специальному заказу.

2. Обозначение фрезы шпоночной, оснащенной твердым сплавом T15K6 диаметром $D = 16$ мм:

I 16T15K6 ГОСТ 6396-52.

1. Standard mills are furnished in right-hand cut. Mills with left-hand cut are special.

2. Designation of a slotting end mill tipped with T15K6 carbide, diameter $D = 16$ mm:

I 16 T15K6 GOST 6396-52.

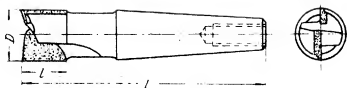
СТАНКОИМПОРТ

**ФРЕЗЫ ШПОНОЧНЫЕ С КОНИЧЕСКИМ ХВОСТОМ,
ОСНАЩЕННЫЕ ТВЕРДЫМ СПЛАВОМ**
(по ГОСТ 6396-52)

**TWO-LIPPED CARBIDE TIPPED SLOTTING END MILLS WITH
TAPER SHANK**
(acc. to GOST 6396-52)

Материал пластинок: вольфрам-титано-кобальтовые сплавы марок ТК для обработки стали и вольфрам-кобальтовые сплавы марок ВК для обработки чугуна.

Material of tips: TK tungsten-titanium carbide for machining steel and BK tungsten carbide for machining cast iron.



Размеры в мм
Dimensions in mm

D	L	l	№ конуса Морзе Morse taper No.	D	L	l	№ конуса Морзе Morse taper No.
12	85	15	1	24	130	25	3
14	85	20	1	28	140	25	3
16	100	20	2	32	145	30	3
18	105	20	2	36	175	30	4
20	110	20	2	40	180	30	4

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими. Фрезы леворежущие изготовляют по специальному заказу.
2. Размеры конусов Морзе - по ГОСТ 2847-45.
3. Обозначение фрезы шпоночной, оснащенной твердым сплавом T15K6 диаметром $D = 32$ мм:

П 32 T15K6 ГОСТ 6396-52.

1. Standard mills are furnished in right-hand cut. Mills with left-hand cut are special.
2. For Morse taper sizes see GOST 2847-45.
3. Designation of a slotting end mill tipped with T15K6 carbide, diameter $D = 32$ mm:

П 32 T15K6 GOST 6396-52.

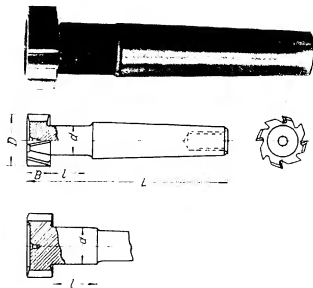
СТАНКОИМПОРТ

ФРЕЗЫ Т-ОБРАЗНЫЕ ДЛЯ СТАНОЧНЫХ ПАЗОВ

(по ГОСТ НКТП 3656)

T-SLOT CUTTERS

(acc. to OST NKTP 3656)

Материал: быстрорежущая сталь.**Material:** high speed steel.Размеры в мм
Dimensions in mm

Номинальный размер паза Nominal slot size	D	B	L	d	l	№ конуса Морзе Morse taper No.	Число зубьев Number of teeth
8	14.5	6.5	78	8	11	1	6
10	17.5	7.5	82	10	12	1	6
12	21.5	9.5	98	12	15	2	8
14	25.5	11.5	102	14	18	2	8
16	29	13	105	16	20	2	8
18	32	15	110	18	23	2	8
20	35	16	130	20	25	3	10
22	38	17	134	22	28	3	10
24	42	19	138	24	30	3	10
26	49	22	148	28	36	3	10
32	55	24	180	32	42	4	12
36	63	27	186	36	46	4	12

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими с правой винтовой канавкой. Фрезы леворежущие или с левой винтовой канавкой изготовляют по специальному заказу.

2. Размеры конусов Морзе — по ГОСТ 2847-45.

3. Обозначение фрезы Т-образной для паза с номинальным размером 14 мм:

14 OST NKTP 3656.

1. Standard cutters are furnished in right-hand cut, right-hand helix. Cutters with left-hand cut or left-hand helix are special.

3. For Morse taper sizes see GOST 2847-45.

3. Designation of a T-slot cutter for a slot of 14 mm nominal size:

14 OST NKTP 3656.

СТАНКОИМПОРТ

**ФРЕЗЫ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
ДЛЯ ПАЗОВ СЕГМЕНТНЫХ ШПОНОК**

(по ГОСТ 6648-53)

STRAIGHT SHANK WOODRUFF KEYSEAT CUTTERS

(acc. to GOST 6648-53)

Материал: быстрорежущая или легированная сталь.

Material: high speed steel or alloy steel.



Размеры в мм
Dimensions in mm

Обозначение фрезы Designation of cutter	D	B	L	d наиб. max.	d ₁ наиб. max.	l ₁ наим. min.	Наим. число зубьев Minimum number of teeth	Для валов диаметром Diameter of shafts
7 × 1,5	7,5	1,5	50	3	3	44	8	6
7 × 2	7,5	2	50	3	3	44	8	6
10 × 2	10,8	2	50	4	4	44	6	6
10 × 3	10,8	3	50	4,5	4,5	43	6	6

1. Стандартные фрезы изготовляют праворежущими. Леворежущие фрезы изготовляют по специальному заказу.

2. Обозначение фрезы для шпонок с номинальным размером 10 × 2 мм:

A 10 × 2 ГОСТ 6648-53.

1. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

2. Designation of a cutter for Woodruff key of 10 × 2 mm nominal size:

A 10 × 2 GOST 6648-53.

СТАНКОИМПОРТ

**ФРЕЗЫ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
ДЛЯ ПАЗОВ СЕГМЕНТНЫХ ШПОНОК**

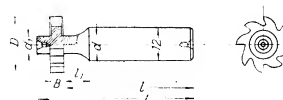
(по ГОСТ 6648-53)

STRAIGHT SHANK WOODRUFF KEYSEAT CUTTERS

(acc. to GOST 6648-53)

Материал: быстрорежущая или легированная сталь.

Material: high speed steel or alloy steel.



Размеры в мм
Dimensions in mm

Обозначение фрезы Designation of cutter	D	B	L	d наиб. max.	d ₁ наиб. max.	l наим. min.	Наим. число зубьев Minimum number of teeth	Для валов диаметром Diameter of shafts
13 × 2	14	2	60	4,5	4,5	53	9	6
13 × 3	14	3	60	5	5	52	9	6
13 × 4	14	4	60	6	6	51	9	6
16 × 3	17,3	3	60	5	5	52	9	8
16 × 4	17,3	4	60	6	6	51	9	8
19 × 3	20,5	3	60	5	5	52	9	8
19 × 4	20,5	4	60	6	6	51	9	8
19 × 5	20,5	5	60	7	7	50	9	8
22 × 4	23,8	4	60	6	6	51	9	8
22 × 5	23,8	5	60	7	7	50	9	8
25 × 5	27	5	60	7	7	50	9	8
28 × 5	30,2	5	60	8	8	50	9	8

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими. Леворежущие фрезы изготовляют по специальному заказу.
2. По специальному заказу фрезы могут быть поставлены с коническими шейками.
3. Обозначение фрезы для шпонки с номинальным размером 22×5 мм:

В 22 \times 5 ГОСТ 6648-53.

1. Standard cutters are furnished in right-hand cut. Cutters with left hand cut are special.
2. On special order cutters can be furnished with tapered neck.
3. Designation of a cutter for Woodruff key of 22×8 mm nominal size:

В 22 \times 8 GOST 6648-53.

ФРЕЗЫ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ ДЛЯ ПАЗОВ СЕГМЕНТНЫХ ШПОНОК

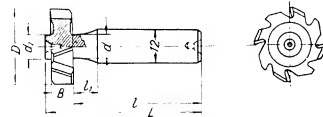
(по ГОСТ 6648-53)

STRAIGHT SHANK WOODRUFF KEYSEAT CUTTERS

(acc. to GOST 6648-53)

Материал: быстрорежущая или легированная сталь.

Material: high speed steel or alloy steel.



Размеры в мм
Dimensions in mm

Обозначение фрезы Designation of cutter	D	B	L	d наиб. max.	d ₁ наиб. max.	l	l ₁ наим. min.	Наим. число зубьев Minimum number of teeth	Для валов диаметром Diameter of shafts
22 \times 6	23,8	6	60	8	8	50	9	8	от 24 до 30 from 24 to 30
25 \times 6	27	6	60	8	8	50	9	8	от 24 до 30 from 24 to 30
25 \times 8	27	8	60	9	9	50	9	8	от 30 до 36 from 30 to 36
28 \times 6	30,2	6	60	9	9	50	9	8	от 24 до 30 from 24 to 30
28 \times 8	30,2	8	60	9	9	50	9	8	от 30 до 36 from 30 to 36
32 \times 6	34,5	6	60	9	9	50	9	8	от 24 до 30 from 24 to 30

1. Стандартные фрезы изготовляют праворежущими. Леворежущие фрезы изготовляют по специальному заказу.
2. Фрезы могут быть изготовлены с прямыми канавками.

СТАНКОИМПОРТ

СТАНКОИМПОРТ

3. По специальному заказу фрезы могут быть поставлены с коническими шейками.

4. Обозначение фрезы для шпонок с номинальным размером 25×8 мм:

V 25 × 8 ГОСТ 6648-53.

1. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

2. Cutters can be furnished with straight teeth.

3. On special order cutters can be furnished with tapered neck.

4. Designation of a cutter for Woodruff key of 25×8 mm nominal size:

V 25 × 8 GOST 6648-53.

ФРЕЗЫ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ ДЛЯ ПАЗОВ СЕГМЕНТНЫХ ШПОНОК

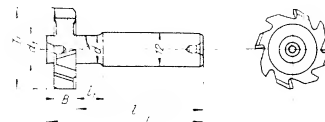
(по ГОСТ 6648-53)

STRAIGHT SHANK WOODRUFF KEYSEAT CUTTERS

(acc. to GOST 6648-53)

Материал: быстрорежущая или легированная сталь.

Material: high speed steel or alloy steel.



Размеры в мм
Dimensions in mm

Обозначение фрезы Designation of cutter	D	B	L	d наиб. max.	d ₁ наиб. max.	l	l ₁ наим. min.	Наим. число зубьев Minimum number of teeth	Для валов диаметром Diameter of shafts
32 × 8	34,5	8	60	10	10	50	10	8	от 30 до 36 from 30 to 36
32 × 10	34,5	10	60	11	—	50	10	8	от 36 до 48 from 36 to 48
35 × 6	37,8	6	60	10	10	50	10	10	от 24 до 30 from 24 to 30
35 × 8	37,8	8	60	11	11	50	10	10	от 30 до 36 from 30 to 36
35 × 10	37,8	10	60	11	—	50	10	10	от 36 до 48 from 36 to 48
38 × 6	41	6	60	11	11	50	10	10	от 24 до 30 from 24 to 30
38 × 8	41	8	60	11	11	50	10	10	от 30 до 36 from 30 to 36
38 × 10	41	10	60	11	—	50	10	10	от 36 до 48 from 36 to 48

СТАНКОИМПОРТ

СТАНКОИМПОРТ

1. Стандартные фрезы изготовляют праворежущими. Леворежущие фрезы изготовляют по специальному заказу.

2. Фрезы могут быть изготовлены с прямыми канавками.

3. Обозначение фрезы для шпонки с номинальным размером 35×10 мм:

G 35 \times 10 ГОСТ 6648-53.

1. Standard cutters are furnished in right-hand cut. Cutters with left-hand cut are special.

2. Cutters can be furnished with straight teeth.

3. Designation of a cutter for Woodruff key of 35×10 mm nominal size:

G 35 \times 10 GOST 6648-53.

СТАНКОИМПОРТ

СПЕЦИАЛЬНЫЕ ФРЕЗЫ

SPECIAL MILLING CUTTERS

Кроме приведенных выше стандартных фрез, промышленность Советского Союза выпускает весьма широкую и многообразную номенклатуру специальных, ненормализованных фрез цельных и сборных конструкций, поставляемых по специальному заказу.

Специальные фрезы выпускают как для обработки плоскостей, так и для обработки сложных фасонных профилей. Фрезы выпускают как из быстрорежущей стали, так и оснащенные твердыми сплавами.

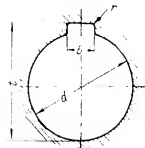
Besides the standard cutters illustrated herein a great variety of types of special non-standard cutters of both solid and sectional design can be furnished on special order.

Special cutters for flat surface work, as well as for irregular shape or profile work are available. These cutters are made of high speed steel or tipped with sintered carbides of different grades.

СТАНКОИМПОРТ

ДИАМЕТРЫ ЦИЛИНДРИЧЕСКИХ ОТВЕРСТИЙ
В ИНСТРУМЕНТЕ
(КРЕПЛЕНИЕ ИНСТРУМЕНТА НА ШПОНКЕ)
(по ГОСТ 4020-48)

DIMENSIONS OF BORES AND KEYWAYS FOR CUTTING TOOLS
(acc. to GOST 4020-48)



Размеры в мм
Dimensions in mm

<i>d</i>		<i>b</i>		<i>t</i>		<i>r</i>
Номинал Nominal size	Допускае- мое отклонение Tolerance	Номинал Nominal size	Допускае- мое отклонение Tolerance	Номинал Nominal size	Допускае- мое отклонение Tolerance	
8	+ 0,016	2	+ 0,06 + 0,18	8,9	+ 0,36	0,2
10	+ 0,016	3	+ 0,06 + 0,18	11,5	+ 0,43	0,3
13	+ 0,019	3	+ 0,06 + 0,18	14,6	+ 0,43	0,4
16	+ 0,019	4	+ 0,08 + 0,24	17,7	+ 0,43	0,5
22	+ 0,023	6	+ 0,08 + 0,24	24,1	+ 0,52	0,5
27	+ 0,023	6	+ 0,08 + 0,24	29,4	+ 0,52	0,8

СТАНКОИМПОРТ

Продолжение
Continued

<i>d</i>		<i>b</i>		<i>t</i>		<i>r</i>
Номинал Nominal size	Допускае- мое отклонение Tolerance	Номинал Nominal size	Допускае- мое отклонение Tolerance	Номинал Nominal size	Допускае- мое отклонение Tolerance	
32	+ 0,027	8	+ 0,1 + 0,3	34,8	+ 0,62	0,8
40	+ 0,027	10	+ 0,1 + 0,3	43,5	+ 0,62	1,0
50	+ 0,027	12	+ 0,12 + 0,36	53,5	+ 0,74	1,0
60	+ 0,03	14	+ 0,12 + 0,36	64,2	+ 0,74	1,2
70	+ 0,03	16	+ 0,12 + 0,36	75,0	+ 0,74	1,5
80	+ 0,03	18	+ 0,12 + 0,36	85,5	+ 0,87	1,5
100	+ 0,035	24	+ 0,14 + 0,42	107	+ 0,87	2

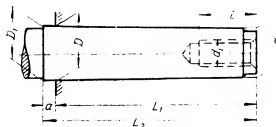
СТАНКОИМПОРТ

НАРУЖНЫЕ КОНУСЫ ДЛЯ ИНСТРУМЕНТОВ (БЕЗ ЛАПКИ)

(по ГОСТ 2847-45)

MORSE TAPER TOOL SHANKS WITHOUT TONGUE

(acc. to GOST 2847-45)



Размеры в мм
Dimensions in mm

№ конуса Морзе Morse taper No.	D	D ₁	d	L ₁	L ₂	a	d ₁	i не менее not less
0	9,045	9,212	6,453	49,5	53	3,2	—	—
1	12,065	12,24	9,396	53,5	57	3,5	M6	16
2	17,78	17,98	14,583	64	68	4	M10	24
3	23,825	24,051	19,784	80,5	85	4,5	M12	28
4	31,267	31,542	25,933	102,7	108	5,3	M14	32
5	44,399	44,731	37,573	129,7	136	6,3	M18	40
6	63,348	63,76	53,905	181,1	189	7,9	M24	50

СТАНКОИМПОРТ

ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ

«СТАНКОИМПОРТ»

экспортирует и импортирует:

Металлорежущие станки
Деревообрабатывающие станки
Кузнечно-прессовое оборудование
Прокатное оборудование (импорт)
Измерительные приборы и инструменты
Приборы и машины для испытания металлов
Оптические приборы и инструменты
Ручной электрический и пневматический инструмент
Режущий инструмент по металлу и дереву
Слесарно-монтажный инструмент и зажимные патроны
Изделия из твердых сплавов
Абразивные изделия
Шариковые и роликовые подшипники
Металлографические, биологические и поляризационные микроскопы
Кинооборудование и киноаппаратуру
Геодезические приборы и инструменты
Фотоаппаратуру, бинокли, лупы, линзы
Сырое оптическое стекло

С запросами на все товары, относящиеся к номенклатуре В/О „Станкоимпорт“ и за дополнительными сведениями просим обращаться по адресу:

Москва, 200, Смоленская-Сенная пл., 32/34
Всесоюзное Экспортно-Импортное Объединение
„Станкоимпорт“.

Телеграфный адрес: Москва Станкоимпорт.

Конструкции и технические характеристики инструмента, приведенного в каталоге, могут быть изменены без дополнительной информации.

СТАНКОИМПОРТ

VSESOJUZNOJE EXPORTNO-IMPORTNOJE OBJEDINENIJE

“STANKOIMPORT”

EXPORT AND IMPORT:

Machine Tools
Woodworking Machinery
Metal Working Machinery (Presses, Hammers, Shears,
Cold Forming Machines, Punching Machines)
Rolling Mills (import)
Measuring Instruments and Apparatus (for metal industry)
Testing Machines and Instruments (for metals)
Optical Instruments and Equipment
Portable Electric and Pneumatic Tools (for metal and woodworking)
Metal and Wood Cutting Tools
Mechanic's Tools and Chucks
Sintered Carbide and Hard-Alloy Products
Abrasive Products
Ball and Roller Bearings
Microscopes of all types
Motion-Picture Equipment and Accessories
Geodetic Instruments and Equipment
Photographic Cameras
Binoculars
Magnifiers
Lenses
Crude Optical Glass Blocks and Blanks

All inquiries and correspondence to be forwarded to:

Vsesojuznoje Exportno-Importnoje Objedinenije

“Stankoimport”

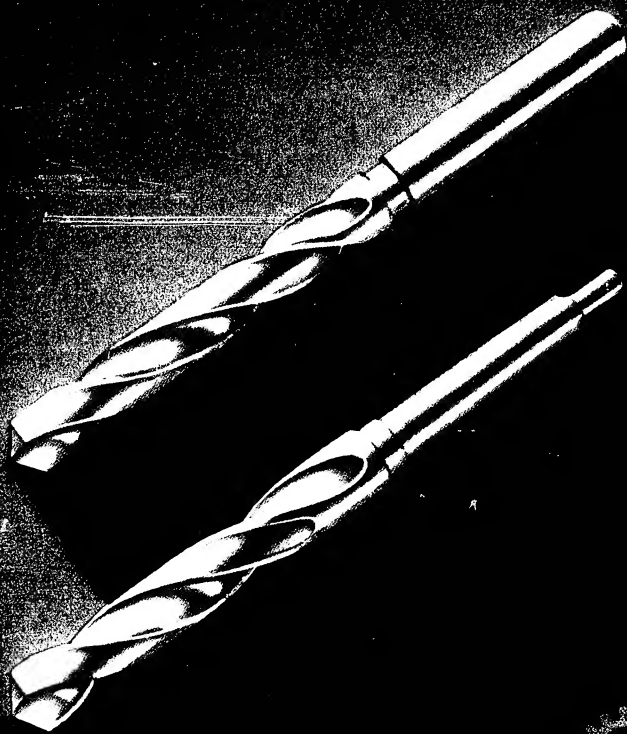
32/34, Smolenskaja-Sennaja pl., Moscow, USSR.

For cables: Stankoimport Moscow

Design and specifications of the tools illustrated herein are subject to change without notice.

СТАНКОИМПОРТ

СВЕРЛА СПИРАЛЬНЫЕ



ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ

СССР

МОСКВА

СВЕРЛА
СПИРАЛЬНЫЕ



STANKOIMPORT



СТАНКОИМПОРТ

Поставляемые В/О „Станкоимпорт“ сверла изготовлены из лучших сортов стали с соответствующей термической обработкой, что обеспечивает им отличную стойкость и позволяет работать на высоких скоростях резания и больших подачах.

Сверла отвечают всем современным требованиям как в отношении геометрии режущих элементов, так и в отношении качества отделки режущих граней инструмента.

The Twist Drills furnished by V/O "Stankoimport" are made of the best grades of steel and undergo suitable heat treatment. This provides for extra long drill life and permits work at higher surface speeds and at heavy feeds.

Geometry of cutting elements and the finish on the cutting edges of the Twist Drills meet all up-to-date requirements.

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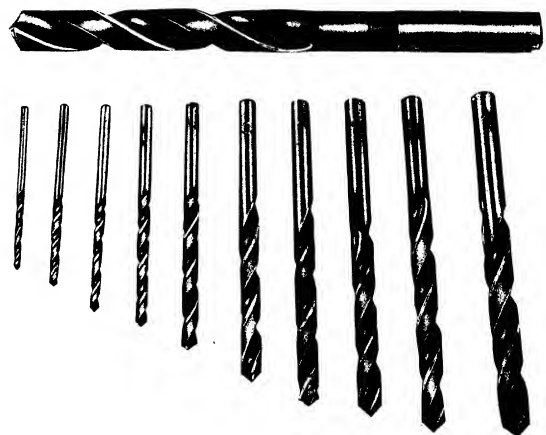
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СВЕРЛА СПИРАЛЬНЫЕ КОРОТКИЕ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
(по ГОСТ 887-63)

STRAIGHT SHANK TWIST DRILLS, SHORT SERIES
(acc. to GOST 887-43)

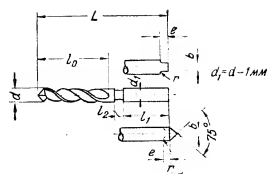
Материал: углеродистая или быстрорежущая сталь
Material: carbon or high speed steel



СТАНКОИМПОРТ



6



Размеры в мм — Dimensions in mm

d	L	l_0
0.25	20	6
0.3	20	6
0.35	22	8
0.4	22	8
0.45	25	8
0.5	25	8
0.55	28	10
0.6	30	10
0.65	30	10
0.7	32	12
0.75	32	12
0.8	35	15
0.85	35	15
0.95	40	18

Размеры в мм — Dimensions in mm

d	L	l_0	e	b	r
3.15	70	40	2.2	1.6	0.3
3.2	70	40	2.2	1.6	0.3
3.3	70	40	2.2	1.6	0.3
3.4	72	42	2.2	1.6	0.3
3.5	72	42	2.2	1.6	0.3
3.6	75	45	2.2	2.0	0.3
3.7	75	45	2.2	2.0	0.3
3.8	75	45	2.2	2.0	0.3
3.9	80	48	2.2	2.0	0.3
4.0	80	48	2.2	2.0	0.3
4.1	82	50	2.5	2.2	0.3
4.2	82	50	2.5	2.2	0.3
4.4	85	52	2.5	2.2	0.3
4.5	85	52	2.5	2.2	0.3
4.7	88	55	2.5	2.5	0.3
4.8	88	55	2.5	2.5	0.3
4.9	90	55	2.5	2.5	0.3
5.0	90	55	2.5	2.5	0.3
5.1	95	60	2.5	2.5	0.3
5.2	95	60	2.5	2.5	0.3
5.3	95	60	2.5	2.5	0.3
5.4	95	60	2.5	2.5	0.3
5.5	95	60	2.5	2.5	0.3

7

Размеры в мм — Dimensions in mm

d	L	l_0	e	b	r
5.7	100	65	3.0	3.0	0.3
5.8	100	65	3.0	3.0	0.3
5.9	100	65	3.0	3.0	0.3
6.0	100	65	3.0	3.0	0.3
6.2	105	68	3.0	3.0	0.3
6.3	105	68	3.0	3.0	0.3
6.4	105	68	3.0	3.0	0.3
6.5	105	68	3.0	3.0	0.3
6.6	110	70	3.5	3.5	0.3
6.7	110	70	3.5	3.5	0.3
6.8	110	70	3.5	3.5	0.3
6.9	110	70	3.5	3.5	0.3
7.0	110	70	4.0	4.0	0.4
7.1	115	75	4.0	4.0	0.4
7.2	115	75	4.0	4.0	0.4
7.3	115	75	4.0	4.0	0.4
7.4	115	75	4.0	4.0	0.4
7.5	115	75	4.0	4.0	0.4
7.6	120	80	4.0	4.0	0.4
7.7	120	80	4.0	4.0	0.4
7.8	120	80	4.0	4.0	0.4
7.9	120	80	4.0	4.0	0.4
8.0	120	80	4.0	4.0	0.4
8.1	125	85	4.0	4.0	0.4
8.2	125	85	4.0	4.0	0.4
8.3	125	85	4.0	4.0	0.4
8.4	125	85	4.0	4.0	0.4
8.5	125	85	4.5	4.5	0.4
8.6	130	90	4.5	4.5	0.4
8.7	130	90	4.5	4.5	0.4
8.8	130	90	4.5	4.5	0.4
8.9	130	90	4.5	4.5	0.4
9.0	130	90	4.5	4.5	0.4
9.1	130	90	4.5	4.5	0.4
9.2	130	90	4.5	4.5	0.4
9.3	130	90	4.5	4.5	0.4
9.4	130	90	4.5	4.5	0.4
9.5	130	90	5.0	5.0	0.4
9.6	135	95	5.0	5.0	0.4
9.7	135	95	5.0	5.0	0.4
9.8	135	95	5.0	5.0	0.4
9.9	135	95	5.0	5.0	0.4
10.0	135	95	5.0	5.0	0.4
10.1	140	95	5.0	5.0	0.4
10.2	140	95	5.0	5.0	0.4
10.3	140	95	5.0	5.0	0.4
10.4	140	95	5.0	5.0	0.4
10.5	140	95	5.0	5.0	0.4
10.6	140	95	5.0	5.0	0.4
10.7	140	95	5.0	5.0	0.4
10.8	140	95	5.0	5.0	0.4
10.9	140	95	5.0	5.0	0.4
11.0	140	95	6.0	6.0	0.4
11.2	145	100	6.0	6.0	0.4
11.3	145	100	6.0	6.0	0.4
11.4	145	100	6.0	6.0	0.4
11.5	145	100	6.0	6.0	0.4
11.7	145	100	6.0	6.0	0.4

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



8

Размеры в мм — Dimensions in mm

<i>d</i>	<i>L</i>	<i>l₀</i>	<i>l₁</i>	<i>l₂</i>	<i>e</i>	<i>b</i>	<i>r</i>
11.8	145	100	—	—	6.0	6.0	0.4
11.9	145	100	—	—	6.0	6.0	0.4
12.0	145	100	—	—	6.0	6.0	0.4
12.1	160	100	45	10	6.0	6.0	0.4
12.3	160	100	45	10	6.0	6.0	0.4
12.4	160	100	45	10	6.0	6.0	0.4
12.5	160	100	45	10	6.0	6.0	0.4
12.7	160	100	45	10	6.0	6.0	0.4
12.8	160	100	45	10	6.0	6.0	0.4
12.9	160	100	45	10	6.0	6.0	0.4
13.0	160	100	45	10	7.0	7.0	0.4
13.2	160	100	45	10	7.0	7.0	0.4
13.3	160	100	45	10	7.0	7.0	0.4
13.5	160	100	45	10	7.0	7.0	0.4
13.7	160	100	45	10	7.0	7.0	0.4
13.8	160	100	45	10	7.0	7.0	0.4
14.0	160	100	45	10	7.0	7.0	0.4
14.3	160	100	45	10	7.0	7.0	0.4
14.4	160	100	45	10	7.0	7.0	0.4
14.5	160	100	45	10	7.0	7.0	0.4
14.6	160	100	45	10	7.0	7.0	0.4
14.7	160	100	45	10	7.0	7.0	0.4
14.8	160	100	45	10	7.0	7.0	0.4
14.9	160	100	45	10	7.0	7.0	0.4
15.0	170	105	50	10	8.0	8.0	0.5
15.1	170	105	50	10	8.0	8.0	0.5
15.2	170	105	50	10	8.0	8.0	0.5
15.3	170	105	50	10	8.0	8.0	0.5
15.4	170	105	50	10	8.0	8.0	0.5
15.5	170	105	50	10	8.0	8.0	0.5
15.6	170	105	50	10	8.0	8.0	0.5
15.7	170	105	50	10	8.0	8.0	0.5
15.8	170	105	50	10	8.0	8.0	0.5
16.0	170	105	50	10	8.0	8.0	0.5
16.2	170	105	50	10	8.0	8.0	0.5
16.3	170	105	50	10	8.0	8.0	0.5
16.4	170	105	50	10	8.0	8.0	0.5
16.5	170	105	50	10	8.0	8.0	0.5
16.6	170	105	50	10	8.0	8.0	0.5
16.8	170	105	50	10	8.0	8.0	0.5
16.9	170	105	50	10	8.0	8.0	0.5
17.0	170	105	50	10	9.0	9.0	0.5
17.1	170	105	50	10	9.0	9.0	0.5
17.2	170	105	50	10	9.0	9.0	0.5
17.3	170	105	50	10	9.0	9.0	0.5
17.4	170	105	50	10	9.0	9.0	0.5
17.5	170	105	50	10	9.0	9.0	0.5
17.6	170	105	50	10	9.0	9.0	0.5
17.7	170	105	50	10	9.0	9.0	0.5
17.9	170	105	50	10	9.0	9.0	0.5
18.0	185	115	55	10	9.0	9.0	0.5
18.3	185	115	55	10	9.0	9.0	0.5
18.4	185	115	55	10	9.0	9.0	0.5
18.5	185	115	55	10	9.0	9.0	0.5
18.6	185	115	55	10	9.0	9.0	0.5
18.8	185	115	55	10	9.0	9.0	0.5
18.9	185	115	55	10	9.0	9.0	0.5
19.0	185	115	55	10	10	10	0.5

9

Размеры в мм — Dimensions in mm

<i>d</i>	<i>L</i>	<i>l₀</i>	<i>l₁</i>	<i>l₂</i>	<i>e</i>	<i>b</i>	<i>r</i>
19.1	185	115	55	10	10	10	0.5
19.2	185	115	55	10	10	10	0.5
19.3	185	115	55	10	10	10	0.5
19.5	185	115	55	10	10	10	0.5
19.6	185	115	55	10	10	10	0.5
19.7	185	115	55	10	10	10	0.5
20.0	185	115	55	10	10	10	0.5
20.3	200	120	65	10	10	10	0.5
20.4	200	120	65	10	10	10	0.5
20.6	200	120	65	10	10	10	0.5
20.7	200	120	65	10	10	10	0.5
20.8	200	120	65	10	10	10	0.5
20.9	200	120	65	10	10	10	0.5
21.0	200	120	65	10	10	10	0.5
21.2	200	120	65	10	10	10	0.5
21.5	200	120	65	10	10	10	0.5
21.6	200	120	65	10	10	10	0.5
21.7	200	120	65	10	10	10	0.5
21.8	200	120	65	10	10	10	0.5
21.9	200	120	65	10	10	10	0.5
22.0	200	120	65	10	10	10	0.5
22.3	200	120	65	10	10	10	0.5
22.6	200	120	65	10	10	10	0.5
22.7	200	120	65	10	10	10	0.5
22.8	200	120	65	10	10	10	0.5
22.9	200	120	65	10	10	10	0.5
23.0	200	120	65	10	10	10	0.5
23.5	200	120	65	10	10	10	0.5
23.6	200	120	65	10	10	10	0.5
23.7	200	120	65	10	10	10	0.5
23.8	200	120	65	10	10	10	0.5
24.0	200	120	65	10	10	10	0.5
24.1	200	120	65	10	10	10	0.5
24.3	200	120	65	10	10	10	0.5
24.6	200	120	65	10	10	10	0.5
24.7	200	120	65	10	10	10	0.5
24.8	200	120	65	10	10	10	0.5
25.0	200	120	65	10	10	10	0.5
25.3	200	120	65	10	10	10	0.5
25.6	200	120	65	10	10	10	0.5
26.0	200	120	65	10	10	10	0.5
26.1	200	120	65	10	10	10	0.5
26.4	200	120	65	10	10	10	0.5
26.6	200	120	65	10	10	10	0.5
26.9	200	120	65	10	10	10	0.5
27.0	200	120	65	10	10	10	0.5
27.6	200	120	65	10	10	10	0.5
27.7	200	120	65	10	10	10	0.5
27.8	200	120	65	10	10	10	0.5
27.9	200	120	65	10	10	10	0.5
28.0	200	120	65	10	10	10	0.5
28.1	200	120	65	10	10	10	0.5
28.3	200	120	65	10	10	10	0.5
28.6	200	120	65	10	10	10	0.5
28.8	200	120	65	10	10	10	0.5
29.0	200	120	65	10	10	10	0.5
29.2	200	120	65	10	10	10	0.5
29.6	200	120	65	10	10	10	0.5
30.0	200	120	65	10	10	10	0.5

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



1. Сверла по настоящему стандарту предназначаются:
 - а) диаметром до 12 мм — для работы на станках общего назначения;
 - б) диаметром свыше 12 мм — для работы на автоматах тяжелого типа.
2. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.
3. Сверла из углеродистой стали изготавливаются без ланки.
4. Сверла из быстрорежущей стали диаметром свыше 3 мм изготавливаются как с ланкой, так и без ланки.
5. Допускается изготовление сверл диаметром до 6 мм с обратным центром.
6. Сверла диаметром свыше 12 мм изготавливаются с шейкой.
7. Обозначение сверла спирального короткого с цилиндрическим хвостом, диаметром 20 мм:

20 ГОСТ 887-43

1. a) Drills up to 12 mm in diameter are designed for general purpose machine-tools;
- b) Drills larger than 12 mm in diameter are designed for heavy-duty automatic machines.
2. For application of twist drills in accordance with drill diameter see table on page 42.
3. Shanks of carbon steel drills are made without tang.
4. Shanks of high speed drills larger than 3 mm in diameter are made either with or without tang.
5. Shanks of drills up to 6 mm in diameter may be made with external center.
6. Drills larger than 12 mm in diameter are furnished with neck.
7. Designation of a straight shank twist drill, short series, 20 mm diameter:

20 GOST 887-43

СВЕРЛА СПИРАЛЬНЫЕ ДЛИННЫЕ С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ
(по ГОСТ 886-41)

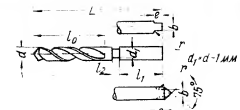
STRAIGHT SHANK TWIST DRILLS, LONG SERIES
(acc. to GOST 886-41)

Материал: углеродистая или быстрорежущая сталь
Material: carbon or high speed steel



Размеры в мм — Dimensions in mm

d	L	ϕ
2	95	50
2.4	95	50
2.2	100	55
2.3	100	55
2.4	100	55
2.5	105	60



Размеры в мм — Dimensions in mm

d	L	l_0	e	b	r
2.6	105	60	—	—	—
2.7	105	60	—	—	—
2.8	110	65	—	—	—
2.9	110	65	—	—	—
3.0	110	65	—	—	—
3.15	115	70	2.2	1.6	0.3
3.2	115	70	2.2	1.6	0.3
3.3	115	70	2.2	1.6	0.3
3.4	115	70	2.2	1.6	0.3
3.5	120	75	2.2	1.6	0.3
3.6	120	75	2.2	2.0	0.3
3.7	120	75	2.2	2.0	0.3
3.8	120	75	2.2	2.0	0.3
3.9	125	80	2.2	2.0	0.3
4.0	125	80	2.2	2.0	0.3
4.2	130	85	2.5	2.2	0.3



Размеры в мм — Dimensions in mm

<i>d</i>	<i>L</i>	<i>l₀</i>	<i>l₁</i>	<i>l₂</i>	<i>e</i>	<i>b</i>	<i>r</i>
4.5	135	85	—	—	2.5	2.2	0.3
4.8	140	90	—	—	2.5	2.5	0.3
4.9	140	90	—	—	2.5	2.5	0.3
5.0	140	90	—	—	2.5	2.5	0.3
5.2	145	95	—	—	2.5	2.5	0.3
5.3	145	95	—	—	2.5	2.5	0.3
5.5	145	95	—	—	2.5	2.5	0.3
5.8	145	95	—	—	3.0	3.0	0.3
6.0	150	100	—	—	3.0	3.0	0.3
6.2	150	100	—	—	3.0	3.0	0.3
6.3	150	100	—	—	3.5	3.5	0.3
6.5	155	105	—	—	3.5	3.5	0.3
6.7	155	105	—	—	3.5	3.5	0.3
6.8	155	105	—	—	4.0	4.0	0.4
7.0	155	105	—	—	4.0	4.0	0.4
7.2	155	105	—	—	4.0	4.0	0.4
7.3	155	105	—	—	4.0	4.0	0.4
7.5	160	110	—	—	4.0	4.0	0.4
7.7	160	110	—	—	4.0	4.0	0.4
7.8	160	110	—	—	4.0	4.0	0.4
8.0	160	110	—	—	4.0	4.0	0.4
8.2	160	110	—	—	4.0	4.0	0.4
8.3	160	110	—	—	4.5	4.5	0.4
8.5	165	110	—	—	4.5	4.5	0.4
8.7	165	110	—	—	4.5	4.5	0.4
8.8	170	115	—	—	4.5	4.5	0.4
9.0	170	115	—	—	4.5	4.5	0.4
9.4	170	115	—	—	4.5	4.5	0.4
9.5	175	115	—	—	5.0	5.0	0.4
9.7	175	115	—	—	5.0	5.0	0.4
9.8	175	115	—	—	5.0	5.0	0.4
10.0	175	115	—	—	5.0	5.0	0.4
10.3	175	115	—	—	5.0	5.0	0.4
10.5	180	120	—	—	5.0	5.0	0.4
10.7	180	120	—	—	5.0	5.0	0.4
11.0	180	120	—	—	6.0	6.0	0.4
11.5	185	125	—	—	6.0	6.0	0.4
11.7	185	125	—	—	6.0	6.0	0.4
12.0	190	125	50	10	6.0	6.0	0.4
12.5	195	130	50	10	6.0	6.0	0.4
12.7	195	130	50	10	6.0	6.0	0.4
13.0	195	130	50	10	7.0	7.0	0.4
13.2	200	130	55	10	7.0	7.0	0.4
13.5	200	130	55	10	7.0	7.0	0.4
13.7	200	130	55	10	7.0	7.0	0.4
14.0	200	130	55	10	7.0	7.0	0.4
14.3	210	140	55	10	7.0	7.0	0.4
14.5	210	140	55	10	7.0	7.0	0.4
15.0	210	140	55	10	8.0	8.0	0.5
15.3	215	145	55	10	8.0	8.0	0.5
15.5	215	145	55	10	8.0	8.0	0.5
15.6	215	145	55	10	8.0	8.0	0.5
16.0	220	145	60	12	8.0	8.0	0.5
16.3	220	145	60	12	8.0	8.0	0.5
16.5	220	145	60	12	8.0	8.0	0.5
16.6	225	150	60	12	8.0	8.0	0.5
17.0	225	150	60	12	9.0	9.0	0.5
17.5	225	150	60	12	9.0	9.0	0.5

Размеры в мм — Dimensions in mm

<i>d</i>	<i>L</i>	<i>l₀</i>	<i>l₁</i>	<i>l₂</i>	<i>e</i>	<i>b</i>	<i>r</i>
17.6	235	155	65	12	9.0	9.0	0.5
18.0	235	155	65	12	9.0	9.0	0.5
18.5	240	160	65	12	9.0	9.0	0.5
18.6	240	160	65	12	9.0	9.0	0.5
19.0	240	160	65	12	10	10	0.5
19.6	245	165	65	12	10	10	0.5
20.0	245	165	65	12	10	10	0.5

1. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.
2. Сверла из углеродистой стали изготавливаются без ланки.
3. Сверла из быстрорежущей стали диаметром свыше 3 мм изготавливаются как с ланкой, так и без ланки.
4. Допускается изготовление сверл диаметром до 6 мм с обратным центром.
5. Сверла диаметром свыше 12 мм изготавливаются с шейкой.
6. Обозначение сверла спирального длинного с цилиндрическим хвостом, диаметром 20 мм:
20 ГОСТ 886-41

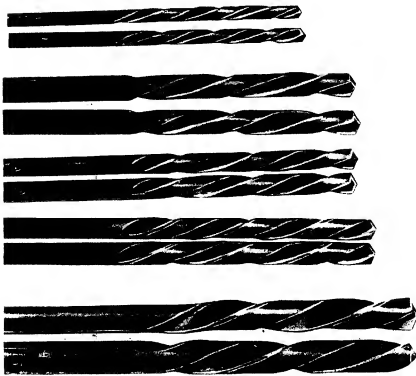
1. For application of twist drills in accordance with drill diameter see table on page 42.
2. Shanks of carbon steel drills are made without tang.
3. Shanks of high speed steel drills larger than 3 mm in diameter are made either with or without tang.
4. Shanks of drills up to 6 mm in diameter may be made with external center.
5. Drills larger than 12 mm in diameter are furnished with neck.
6. Designation of straight shank twist drill, long series, 20 mm diameter:
20 GOST 886-41



СВЕРЛА СПИРАЛЬНЫЕ ЛЕВЫЕ
С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ ДЛЯ АВТОМАТОВ
(по ГОСТ 2090-43)

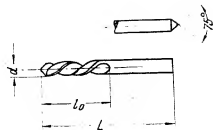
LEFT-HAND STRAIGHT SHANK TWIST DRILLS
FOR AUTOMATIC MACHINES
(acc. to GOST 2090-43)

Материал: углеродистая или быстрорежущая сталь
Material: carbon or high speed steel



Размеры в мм — Dimensions in mm

d	L	l ₀
1.1	60	30
1.2	60	30
1.35	60	30
1.5	60	30
1.6	60	30
1.75	60	30



Размеры в мм — Dimensions in mm

d	L	l ₀
2	65	35
2.05	65	35
2.1	65	35
2.15	65	35
2.2	65	35
2.25	65	35
2.3	65	35
2.4	65	35
2.5	65	35
2.6	65	35
2.65	65	35
2.7	65	35
2.8	65	35
2.9	65	35
3	70	40
3.15	70	40
3.2	70	40
3.3	70	40
3.4	70	40
3.5	70	40
3.6	70	40
3.7	70	40
3.8	70	40
3.9	70	40
4	70	40
4.1	70	40
4.2	70	40
4.4	70	40
4.5	70	40
4.7	70	40
4.8	70	40
4.9	70	40
5	75	45
5.1	75	45
5.2	75	45
5.3	75	45
5.4	75	45
5.5	75	45
5.7	75	45
5.8	75	45
5.9	75	45
6	75	45
6.2	75	45
6.3	75	45
6.4	75	45
6.5	75	45
6.6	75	45
6.7	75	45
6.8	75	45
6.9	75	45
7	75	45
7.1	75	45
7.2	75	45
7.3	75	45
7.4	75	45
7.5	75	45
7.6	75	45
7.7	75	45
7.8	75	45
7.9	75	45
8	80	50
8.1	80	50
8.2	80	50
8.3	80	50
8.4	80	50
8.5	80	50
8.6	80	50
8.7	80	50
8.8	80	50
8.9	80	50
9	80	50
9.1	80	50
9.2	80	50
9.3	80	50
9.4	80	50
9.5	80	50
9.6	80	50
9.7	80	50
9.8	80	50
9.9	80	50
10	80	50
10.1	80	50
10.2	80	50
10.3	80	50
10.4	80	50
10.5	80	50
10.6	80	50
10.7	80	50
10.8	80	50
10.9	80	50
11	80	50
11.2	80	50
11.3	80	50
11.4	80	50
11.5	80	50
11.7	80	50
11.8	80	50
11.9	80	50
12	80	50
12.1	80	50
12.3	80	50
12.4	80	50
12.5	80	50
12.7	80	50
12.8	80	50
12.9	80	50
13	85	55
13.2	85	55
13.3	85	55
13.5	85	55
13.7	85	55
13.8	85	55
14	85	55
14.3	85	55
14.4	85	55
14.5	85	55



16

Размеры в мм — Dimensions in mm

<i>d</i>	<i>L</i>	<i>l₀</i>
14.6	85	55
14.7	85	55
14.8	85	55
14.9	85	55
15	90	55
15.1	90	55
15.2	90	55
15.3	90	55
15.4	90	55
15.5	90	55
15.6	90	55
15.7	90	55
15.8	90	55
16	90	55
16.2	90	55
16.3	90	55
16.4	90	55
16.5	90	55
16.6	90	55
16.8	90	55
16.9	90	55
17	90	55
17.1	90	55
17.2	90	55
17.3	90	55
17.4	90	55
17.5	90	55
17.6	90	55
17.7	90	55
17.9	90	55
18	90	55
18.3	90	55
18.4	90	55
18.5	90	55
18.6	90	55
18.8	90	55
18.9	90	55
19	90	55

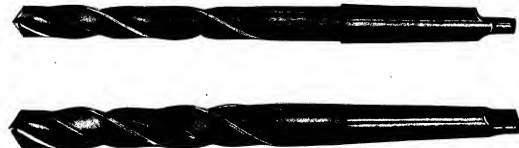
<i>d</i>	<i>L</i>	<i>l₀</i>
19.1	90	55
19.2	90	55
19.3	90	55
19.5	90	55
19.6	90	55
19.7	90	55
20	100	60
20.3	100	60
20.4	100	60
20.6	100	60
20.7	100	60
20.8	100	60
20.9	100	60
21	100	60
21.2	100	60
21.5	100	60
21.6	100	60
21.7	100	60
21.8	100	60
21.9	100	60
22	100	60
22.3	100	60
22.6	100	60
22.7	100	60
22.8	100	60
22.9	100	60
23	100	60
23.5	100	60
23.6	100	60
23.7	100	60
24	100	60
24.1	100	60
24.3	100	60
24.6	100	60
24.7	100	60
24.8	100	60
25	100	60

СВЕРЛА СПИРАЛЬНЫЕ С КОНИЧЕСКИМ ХВОСТОМ
(по ГОСТ 888-41)

TAPER SHANK TWIST DRILLS
(acc. to GOST 888-41)

Материал: углеродистая или быстрорежущая сталь

Material: carbon or high speed steel



1. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.

2. Допускается изготовление сверл диаметром до 6 мм с обратным центром.

3. Обозначение сверла спирального левого с цилиндрическим хвостом для автоматов, диаметр 20 мм:

20 ГОСТ 2090-43

1. For application of twist drills in accordance with drill diameter see table on page 42.

2. Drills up to 6 mm in diameter may be made with external center.

3. Designation of a left-hand straight shank twist drill for automatic machines, 20 mm diameter:

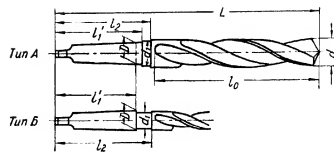
20 GOST 2090-43

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



18



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
6.0	<i>E</i>	160	78	Морзе № 1	77.5	$d - 0.7$
6.2	<i>E</i>	160	78	Morse No. 1	77.5	
6.3	<i>E</i>	160	78	$D = 12.239$	77.5	
6.4	<i>E</i>	160	78		77.5	
6.5	<i>E</i>	160	78	$l_1 = 65.5$	77.5	
6.6	<i>E</i>	160	78	$l_1 = 70$	77.5	
6.7	<i>E</i>	160	78		77.5	
6.8	<i>E</i>	160	78		77.5	
6.9	<i>E</i>	160	78		77.5	
7.0	<i>E</i>	165	83		77.5	
7.1	<i>E</i>	165	83		77.5	
7.2	<i>E</i>	165	83		77.5	
7.3	<i>E</i>	165	83		77.5	
7.4	<i>E</i>	165	83		77.5	
7.5	<i>E</i>	165	83		77.5	
7.6	<i>E</i>	165	83		77.5	
7.7	<i>E</i>	165	83		77.5	
7.8	<i>E</i>	165	83		77.5	
7.9	<i>E</i>	165	83		77.5	
8.0	<i>E</i>	170	88		77.5	
8.1	<i>E</i>	170	88		77.5	
8.2	<i>E</i>	170	88		77.5	
8.3	<i>E</i>	170	88		77.5	
8.4	<i>E</i>	170	88		77.5	
8.5	<i>E</i>	170	88		77.5	
8.6	<i>E</i>	170	88		77.5	
8.7	<i>E</i>	170	88		77.5	
8.8	<i>E</i>	170	88		77.5	
8.9	<i>E</i>	170	88		77.5	
9.0	<i>E</i>	175	93		77.5	
9.1	<i>E</i>	175	93		77.5	
9.2	<i>E</i>	175	93		77.5	
9.3	<i>E</i>	175	93		77.5	
9.4	<i>E</i>	175	93		77.5	
9.5	<i>E</i>	175	93		77.5	
9.6	<i>E</i>	175	93		77.5	
9.7	<i>E</i>	175	93		77.5	
9.8	<i>E</i>	175	93		77.5	
9.9	<i>E</i>	175	93		77.5	
10.0	<i>E</i>	180	98		77.5	

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Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
10.1	<i>E</i>	180	98	Морзе № 1	77.5	$d - 0.7$
10.2	<i>E</i>	180	98	Morse No. 1	77.5	
10.3	<i>E</i>	180	98	$D = 12.239$	77.5	
10.4	<i>E</i>	180	98		77.5	
10.5	<i>E</i>	180	98	$l_1 = 65.5$	77.5	
10.6	<i>E</i>	180	98	$l_1 = 70$	77.5	
10.7	<i>E</i>	180	98		77.5	
10.8	<i>E</i>	180	98		77.5	
10.9	<i>E</i>	180	98		77.5	
11.0	<i>E</i>	185	103		77.5	
11.2	<i>E</i>	185	103		77.5	
11.3	<i>E</i>	185	103		77.5	
11.4	<i>E</i>	185	103		77.5	
11.5	<i>E</i>	185	103		77.5	
11.7	<i>E</i>	185	103		77.5	
11.8	<i>E</i>	185	103		77.5	
11.9	<i>E</i>	185	103		77.5	
12.0	<i>E</i>	190	108		77.5	
12.1	<i>E</i>	190	108		77.5	
12.3	<i>E</i>	190	108		77.5	
12.4	<i>E</i>	190	108		77.5	
12.5	<i>E</i>	190	108		77.5	
12.7	<i>E-A</i>	190	108		77.5	
12.8	<i>E-A</i>	190	108		77.5	
12.9	<i>E-A</i>	190	108		77.5	
13.0	<i>E-A</i>	195	113		77.5	
13.2	<i>E-A</i>	195	113		77.5	
13.3	<i>E-A</i>	195	113		77.5	
13.5	<i>E-A</i>	195	113		77.5	
13.7	<i>E-A</i>	195	113		77.5	
13.8	<i>E-A</i>	195	113		77.5	
14.0	<i>A</i>	200	118		77.5	
14.3	<i>A</i>	200	118		77.5	
14.4	<i>A</i>	200	118		77.5	
14.5	<i>A</i>	200	118		77.5	
14.6	<i>A</i>	200	118		77.5	
14.7	<i>A</i>	200	118		77.5	
14.8	<i>A</i>	200	118		77.5	
14.9	<i>A</i>	200	118		77.5	
15.0	<i>A</i>	205	123		77.5	
15.1	<i>A</i>	205	123		77.5	
15.2	<i>A</i>	205	123		77.5	
15.3	<i>A</i>	205	123		77.5	
15.4	<i>A</i>	205	123		77.5	
15.5	<i>A</i>	205	123		77.5	
15.6	<i>E</i>	225	130	Морзе № 2	90.5	$d - 0.8$
15.7	<i>E</i>	225	130	Morse No. 2	90.5	
15.8	<i>E</i>	225	130	$D = 17.981$	90.5	
16.0	<i>E</i>	225	130		90.5	
16.2	<i>E</i>	225	130	$l_1 = 78.5$	90.5	
16.3	<i>E</i>	225	130	$l_1 = 83$	90.5	
16.4	<i>E</i>	225	130		90.5	
16.5	<i>E</i>	225	130		90.5	
16.6	<i>E</i>	225	130		90.5	
16.8	<i>E</i>	225	130		90.5	
16.9	<i>E</i>	225	130		90.5	

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
17.0	<i>B</i>	230	135	Морзе № 2 Morse No. 2 $D = 17.981$ $l_1 = 78.5$ $l'_1 = 83$	90.5	$d - 0.8$
17.1	<i>B</i>	230	135		90.5	
17.2	<i>B</i>	230	135		90.5	
17.3	<i>B</i>	230	135		90.5	
17.4	<i>B</i>	230	135		90.5	
17.5	<i>B</i>	230	135		90.5	
17.6	<i>B</i>	230	135		90.5	
17.7	<i>B</i>	230	135		90.5	
17.9	<i>B</i>	230	135		90.5	
18.0	<i>B</i>	235	140		90.5	
18.3	<i>B</i>	235	140	Тип <i>B</i> } Типе <i>B</i> } Тип <i>A</i> } Типе <i>A</i> }	90.5	$d - 0.8$
18.4	<i>B</i>	235	140		90.5	
18.5	<i>B</i>	235	140		90.5	
18.6	<i>B-A</i>	235	140		90.5	
18.8	<i>B-A</i>	235	140		90.5	
18.9	<i>B-A</i>	235	140		90.5	
19.0	<i>B-A</i>	240	145		90.5	
19.1	<i>B-A</i>	240	145		90.5	
19.2	<i>B-A</i>	240	145		90.5	
19.3	<i>B-A</i>	240	145		90.5	
19.5	<i>B-A</i>	240	145		90.5	$d - 0.8$
19.6	<i>A</i>	240	145		90.5	
19.7	<i>A</i>	240	145		90.5	
20.0	<i>A</i>	245	150		90.5	
20.3	<i>A</i>	245	150		90.5	
20.4	<i>A</i>	245	150		90.5	
20.6	<i>A</i>	245	150		90.5	
20.7	<i>A</i>	245	150		90.5	
20.8	<i>A</i>	245	150		90.5	
20.9	<i>A</i>	245	150		90.5	
21.0	<i>A</i>	250	155		90.5	
21.2	<i>A</i>	250	155		90.5	
21.5	<i>A</i>	250	155		90.5	
21.6	<i>A</i>	250	155		90.5	
21.7	<i>A</i>	250	155		90.5	
21.8	<i>A</i>	250	155		90.5	
21.9	<i>A</i>	250	155		90.5	
22.0	<i>A</i>	255	160		90.5	
22.3	<i>A</i>	255	160		90.5	
22.6	<i>A</i>	255	160		90.5	
22.7	<i>A</i>	255	160		90.5	
22.8	<i>A</i>	255	160		90.5	
22.9	<i>A</i>	255	160		90.5	
23.0	<i>A</i>	255	160		90.5	
23.5	<i>A</i>	255	160		90.5	
23.6	<i>B</i>	290	170	Морзе № 3 Morse No. 3 $D = 24.052$ $l_1 = 98$ $l'_1 = 105$	113	Тип <i>B</i> } Типе <i>B</i> } Тип <i>A</i> } Типе <i>A</i> }
23.7	<i>B</i>	290	170		113	
24.0	<i>B</i>	290	170		113	
24.1	<i>B</i>	290	170		113	
24.3	<i>B</i>	290	170		113	
24.6	<i>B-A</i>	290	170		113	
24.7	<i>B-A</i>	290	170		113	
24.8	<i>B-A</i>	290	170		113	
25.0	<i>B-A</i>	295	175		113	
25.3	<i>B-A</i>	295	175		113	
25.6	<i>B-A</i>	295	175		113	
26.0	<i>B-A</i>	300	180		113	

Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
26.1	<i>A</i>	300	180	Морзе № 3 Morse No. 3 $D = 24.052$ $l_1 = 98$ $l'_1 = 105$	113	$d - 1.0$
26.4	<i>A</i>	300	180		113	
26.6	<i>A</i>	300	180		113	
26.9	<i>A</i>	300	180		113	
27.0	<i>A</i>	305	185		113	
27.6	<i>A</i>	305	185		113	
27.7	<i>A</i>	305	185		113	
27.8	<i>A</i>	305	185		113	
27.9	<i>A</i>	305	185		113	
28.0	<i>A</i>	310	190		113	
28.1	<i>A</i>	310	190		113	
28.3	<i>A</i>	310	190		113	
28.6	<i>A</i>	310	190		113	
28.8	<i>A</i>	310	190		113	
29.0	<i>A</i>	320	200		113	
29.2	<i>A</i>	320	200		113	
29.6	<i>A</i>	320	200		113	
30.0	<i>A</i>	320	200		113	
30.5	<i>A</i>	320	200		113	
30.7	<i>A</i>	320	200		113	
30.8	<i>A</i>	320	200		113	
31.0	<i>A</i>	325	205		113	
31.3	<i>A</i>	325	205		113	
31.4	<i>A</i>	325	205		113	
31.5	<i>A</i>	325	205		113	
31.6	<i>A</i>	325	205		113	
32.0	<i>A</i>	325	205		113	
32.5	<i>A</i>	325	205		113	
32.6	<i>B-A</i>	365	215	Морзе № 4 Morse No. 4 $D = 31.544$ $l_1 = 123$ $l'_1 = 132$	140	Тип <i>B</i> } Типе <i>B</i> } Тип <i>A</i> } Типе <i>A</i> }
32.7	<i>B-A</i>	365	215		140	
33.0	<i>B-A</i>	365	215		140	
33.4	<i>B-A</i>	365	215		140	
33.5	<i>B-A</i>	365	215		140	
33.6	<i>B-A</i>	365	215		140	
33.7	<i>B-A</i>	365	215		140	
34.0	<i>B-A</i>	365	215		140	
34.4	<i>B-A</i>	365	215		140	
34.5	<i>B-A</i>	365	215		140	
34.6	<i>B-A</i>	365	215		140	
35.0	<i>B-A</i>	370	220		140	
35.2	<i>A</i>	370	220		140	
35.5	<i>A</i>	370	220		140	
35.6	<i>A</i>	370	220		140	
35.7	<i>A</i>	370	220		140	
35.8	<i>A</i>	370	220		140	
35.9	<i>A</i>	370	220		140	
36.0	<i>A</i>	370	220		140	
36.5	<i>A</i>	370	220		140	
36.6	<i>A</i>	370	220		140	
36.7	<i>A</i>	370	220		140	
36.8	<i>A</i>	370	220		140	
37.0	<i>A</i>	375	225		140	
37.3	<i>A</i>	375	225		140	
37.5	<i>A</i>	375	225		140	
37.6	<i>A</i>	375	225		140	
38.0	<i>A</i>	375	225		140	



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
38.5	A	375	225	Морзе № 4	140	$d - 1.2$
38.6	A	375	225	Morse No. 4	140	
38.7	A	375	225	$D = 31.544$	140	
38.9	A	375	225		140	
39.0	A	380	230	$l_1 = 123$	140	
39.2	A	380	230	$l_1' = 132$	140	
39.5	A	380	230		140	
39.6	A	380	230		140	
39.7	A	380	230		140	
39.8	A	380	230		140	
40.0	A	380	230		140	
40.5	A	380	230		140	
41.0	A	380	230		140	
41.4	A	380	230		140	
41.5	A	380	230		140	
41.6	A	380	230		140	
41.7	A	380	230		140	
42.0	A	385	235		140	
42.2	A	385	235		140	
42.4	A	385	235		140	
42.5	A	385	235		140	
42.7	A	385	235		140	
43.0	A	385	235		140	
43.3	A	385	235		140	
43.5	A	385	235		140	
44.0	A	390	240		140	
44.4	A	390	240		140	
44.5	A	390	240		140	
44.6	A	390	240		140	
44.7	A	390	240		140	
44.8	A	390	240		140	
45.0	A	395	245		140	
45.1	A	395	245		140	
45.5	A	395	245		140	
45.6	A	395	245		140	
45.7	A	395	245		140	
46.0	A	395	245		140	
46.2	A	395	245		140	
46.4	A	395	245		140	
46.5	A	395	245		140	
47.0	A	400	250		140	
47.5	A	400	250		140	
47.6	A	400	250		140	
48.0	A	400	250		140	
48.6	A	400	250		140	
48.7	A	400	250		140	
49.0	A	400	250		140	
49.5	A	400	250		140	
49.6	B-A	440	255	Морзе № 5	172.5	Тип B | $D - 1.2$
49.7	B-A	440	255	Morse No. 5	172.5	Тип B | $D - 1.2$
50.0	B-A	440	255	$D = 44.732$	172.5	Тип A | $d - 1.2$
51	B-A	440	255		172.5	Тип A | $d - 1.2$
52	A	450	265	$l_1 = 155.5$	172.5	$d - 1.2$
53	A	450	265	$l_1' = 164.5$	172.5	
54	A	450	265		172.5	
55	A	450	265		172.5	

Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
56	A	450	265	Морзе № 5	172.5	$d - 1.2$
57	A	450	265	Morse No. 5	172.5	
58	A	460	275	$D = 44.732$	172.5	
60	A	460	275	$l_1 = 155.5$	172.5	
62	A	460	275	$l_1' = 164.5$	172.5	
65	A	460	275		172.5	
68	A	535	285	Морзе № 6	237.5	$d - 1.2$
70	A	535	285	Morse No. 6	237.5	
72	A	535	285	$D = 63.762$	237.5	
75	A	535	285	$l_1 = 217.5$	237.5	
78	A	535	285	$l_1' = 227.5$	237.5	
80	A	535	285		237.5	

1. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.

2. Сверла диаметром от 6 до 10 мм могут изготавливаться без шейки.

3. Сверла типа A могут быть изготовлены с канавкой на хвосте для выхода шлифовального круга.

4. Обозначение сверла спирального с коническим хвостом типа A, диаметром 25 мм:

A 25 ГОСТ 888-41

1. For application of twist drills in accordance with drill diameter see table on page 42.

2. Drills from 6 to 10 mm in diameter may be made without neck.

3. Drills of type A may be made with a recess on shank providing a way for the grinding wheel.

4. Designation of taper shank twist drill, type A, 25 mm diameter:

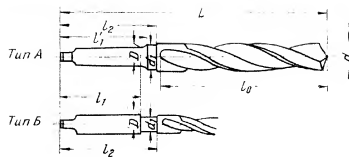
A 25 GOST 888-41



СВЕРЛА СПИРАЛЬНЫЕ УДЛИНЕННЫЕ С КОНИЧЕСКИМ ХВОСТОМ
(по ГОСТ 2092-43)

TAPER SHANK TWIST DRILLS, LONG SERIES
(acc. to GOST 2092-43)

Материал: быстрорежущая сталь.
Material: high speed steel



Размеры в мм — Dimensions in mm

d	Тип Type	L	l ₀	Конус хвоста Shank taper	l ₂	d ₁
6.0	Б	230	145	Морзе №1	77.5	d - 0.7
6.2	Б	230	145	Морзе №1	77.5	
6.3	Б	230	145	D = 12.239	77.5	
6.4	Б	230	145	l ₁ = 65.5	77.5	
6.5	Б	230	145	l ₁ = 70	77.5	
6.6	Б	230	145		77.5	
6.7	Б	230	145		77.5	
6.8	Б	230	145		77.5	
6.9	Б	230	145		77.5	
7.0	Б	250	165		77.5	
7.1	Б	250	165		77.5	
7.2	Б	250	165		77.5	
7.3	Б	250	165		77.5	
7.4	Б	250	165		77.5	
7.5	Б	250	165		77.5	
7.6	Б	250	165		77.5	
7.7	Б	250	165		77.5	
7.8	Б	250	165		77.5	
7.9	Б	250	165		77.5	
8.0	Б	250	165		77.5	

Размеры в мм — Dimensions in mm

d	Тип Type	L	l ₀	Конус хвоста Shank taper	l ₂	d ₁
8.1	Б	250	165	Морзе №1	77.5	d - 0.7
8.2	Б	250	165	Морзе №1	77.5	
8.3	Б	250	165	D = 12.239	77.5	
8.4	Б	250	165	l ₁ = 65.5	77.5	
8.5	Б	250	165	l ₁ = 70	77.5	
8.6	Б	250	165		77.5	
8.7	Б	250	165		77.5	
8.8	Б	250	165		77.5	
8.9	Б	250	165		77.5	
9.0	Б	250	165		77.5	
9.1	Б	250	165		77.5	
9.2	Б	250	165		77.5	
9.3	Б	250	165		77.5	
9.4	Б	250	165		77.5	
9.5	Б	250	165		77.5	
9.6	Б	250	165		77.5	
9.7	Б	250	165		77.5	
9.8	Б	250	165		77.5	
9.9	Б	250	165		77.5	
10.0	Б	260	175		77.5	
10.1	Б	260	175		77.5	
10.2	Б	260	175		77.5	
10.3	Б	260	175		77.5	
10.4	Б	260	175		77.5	
10.5	Б	260	175		77.5	
10.6	Б	260	175		77.5	
10.7	Б	260	175		77.5	
10.8	Б	260	175		77.5	
10.9	Б	260	175		77.5	
11.0	Б	260	175		77.5	
11.2	Б	260	175		77.5	
11.3	Б	260	175		77.5	
11.4	Б	260	175		77.5	
11.5	Б	260	175		77.5	
11.7	Б	260	175		77.5	
11.8	Б	260	175		77.5	
11.9	Б	260	175		77.5	
12.0	Б	270	185		77.5	
12.1	Б	270	185		77.5	
12.3	Б	270	185		77.5	
12.4	Б	270	185		77.5	
12.5	Б	270	185		77.5	
12.7	Б-А	270	185		77.5	
12.8	Б-А	270	185		77.5	
12.9	Б-А	270	185		77.5	
13.0	Б-А	270	185		77.5	
13.2	Б-А	270	185		77.5	
13.3	Б-А	270	185		77.5	
13.5	Б-А	270	185		77.5	
13.7	Б-А	270	185		77.5	
13.8	Б-А	270	185		77.5	
14.0	А	280	195		77.5	
14.3	А	280	195		77.5	
14.4	А	280	195		77.5	
14.5	А	280	195		77.5	
14.6	А	280	195		77.5	
14.7	А	280	195		77.5	

Тип Б } D - 0.7
Type Б }
Тип А } d - 0.7
Type А }



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
14.8	A	280	195	Морзе №1	77.5	Тип B } $d - 0.7$
14.9	A	280	195	Morse No. 1	77.5	Type B }
15.0	A	280	195	$D = 12.239$	77.5	Тип A } $d - 0.7$
15.1	A	280	195	$l_1 = 65.5$	77.5	Type A }
15.2	A	280	195	$l_1 = 70$	77.5	
15.3	A	280	195		77.5	
15.4	A	280	195		77.5	
15.5	A	280	195		77.5	
15.6	B	290	195	Морзе №2	90.5	$d - 0.8$
15.7	B	290	195	Morse No. 2	90.5	
15.8	B	290	195	$D = 17.981$	90.5	
16.0	B	290	195	$l_1 = 78.5$	90.5	
16.2	B	290	195	$l_1 = 83$	90.5	
16.3	B	290	195		90.5	
16.4	B	290	195		90.5	
16.5	B	290	195		90.5	
16.6	B	290	195		90.5	
16.8	B	290	195		90.5	
16.9	B	290	195		90.5	
17.0	B	290	195		90.5	
17.1	B	290	195		90.5	
17.2	B	290	195		90.5	
17.3	B	290	195		90.5	
17.4	B	290	195		90.5	
17.5	B	290	195		90.5	
17.6	B	290	195		90.5	
17.7	B	290	195		90.5	
17.9	B	290	195		90.5	
18.0	B	320	215		90.5	Тип B } $d - 0.8$
18.3	B	320	215		90.5	Type B }
18.4	B	320	215		90.5	Тип A } $d - 0.8$
18.5	B	320	215		90.5	Type A }
18.6	B-A	320	215		90.5	
18.8	B-A	320	215		90.5	
18.9	B-A	320	215		90.5	
19.0	B-A	320	215		90.5	
19.1	B-A	320	215		90.5	
19.2	B-A	320	215		90.5	
19.3	B-A	320	215		90.5	
19.5	B-A	320	215		90.5	
19.6	A	320	215		90.5	$d - 0.8$
19.7	A	320	215		90.5	
20.0	A	340	235		90.5	
20.3	A	340	235		90.5	
20.4	A	340	235		90.5	
20.6	A	340	235		90.5	
20.7	A	340	235		90.5	
20.8	A	340	235		90.5	
20.9	A	340	235		90.5	
21.0	A	340	235		90.5	
21.2	A	340	235		90.5	
21.5	A	340	235		90.5	
21.6	A	340	235		90.5	
21.7	A	340	235		90.5	
21.8	A	340	235		90.5	
21.9	A	340	235		90.5	

Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	d_1
22.0	A	340	235	Морзе №2	90.5	$d - 0.8$
22.3	A	340	235	Morse No. 2	90.5	
22.6	A	340	235	$D = 17.981$	90.5	
22.7	A	340	235	$l_1 = 78.5$	90.5	
22.8	A	340	235	$l_1 = 83$	90.5	
22.9	A	340	235		90.5	
23.0	A	340	235		90.5	
23.5	A	340	235		90.5	
23.6	B	360	240	Морзе №3	113	Тип B } $d - 1.0$
23.7	B	360	240	Morse No. 3	113	Type B }
24.0	B	360	240	$D = 24.052$	113	Тип A } $d - 1.0$
24.1	B	360	240	$l_1 = 98$	113	Type A }
24.3	B	360	240	$l_1 = 105$	113	
24.6	B-A	360	240		113	
24.7	B-A	360	240		113	
24.8	B-A	360	240		113	
25.0	B-A	360	240		113	
25.3	B-A	360	240		113	
25.6	B-A	360	240		113	
26.0	B-A	380	250		113	
26.4	A	380	250		113	
26.4	A	380	250		113	
26.6	A	380	250		113	
26.9	A	380	250		113	
27.0	A	380	250		113	
27.6	A	380	250		113	
27.7	A	380	250		113	
27.8	A	380	250		113	
27.9	A	380	250		113	
28.0	A	410	275		113	
28.1	A	410	275		113	
28.3	A	410	275		113	
28.6	A	410	275		113	
28.8	A	410	275		113	
29.0	A	410	275		113	
29.2	A	410	275		113	
29.6	A	410	275		113	
30.0	A	410	275		113	

1. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.
2. Сверла диаметром от 6 до 10 мм могут изготовляться без шейки.
3. Обозначение сверла спирального удлиненного с коническим хвостом типа А, диаметром 25 мм:

А 25 ГОСТ 2092-43

1. For application of twist drills in accordance with drill diameter see table on page 42.
2. Drills from 6 to 10 mm in diameter may be made without neck.
3. Designation of a taper shank twist drill, longseries, type A, 25 mm diameter:

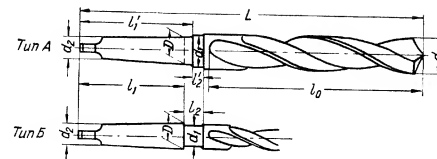
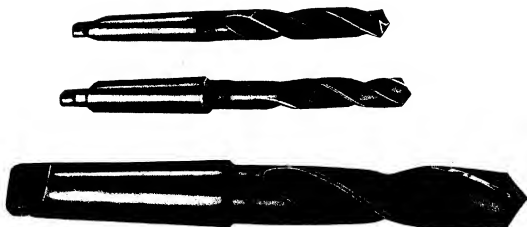
A 25 GOST 2092-43



СВЕРЛА СПИРАЛЬНЫЕ УКОРОЧЕННЫЕ С УСИЛЕННЫМ
КОНИЧЕСКИМ ХВОСТОМ
(по OST 20182-40)

TAPER SHANK TWIST DRILLS, SHORT SERIES,
SHANKS LARGER THAN REGULAR
(acc. to OST 20182-40)

Материал: быстрорежущая сталь
Material: high speed steel



29

Размеры в мм — Dimensions in mm

d	Тип Type	L	l ₀	Конус хвоста Shank taper	l ₂	l ₁	d ₁
6	B	135	55	Морзе №1	12	—	d — 0.5
6.5	B	135	55	Morse No. 1	12	—	
7	B	140	60	D = 12.239	12	—	
7.5	B	140	60	d ₂ = 8.973	12	—	
8	B	140	60	l ₁ = 65.5	12	—	
8.5	B	145	65		12	—	
9	B	145	65		12	—	
9.5	B	145	65		12	—	
10	B	150	70		12	—	
10.5	B	150	70		12	—	
11	B	155	75		12	—	
12	B	170	75	Морзе №2	12	—	d — 0.5
12.5	B	175	80	Morse No. 2	12	—	
13	B	175	80	D = 17.981	12	—	
13.5	B	180	85	d ₂ = 14.060	12	—	
14	B	180	85	l ₁ = 78.5	12	—	
14.5	B	185	90		12	—	
15	B	185	90		12	—	
16	B	190	95		12	—	
17	B	195	100		12	—	
18	B	195	100		12	—	
19	B	225	105	Морзе №3	15	—	d — 0.5
20	B	230	110	Morse No. 3	15	—	
21	B	230	110	D = 24.052	15	—	
22	B	235	115	d ₂ = 19.133	15	—	
23	B	235	115	l ₁ = 98	15	—	
24	B	240	120	l ₁ = 105	15	—	
25	A	245	125		—	8	
26	A	250	130		—	8	
27	B	285	135	Морзе №4	17	—	d — 1.0
28	B	290	140	Morse No. 4	17	—	
29	B	295	145	D = 31.544	17	—	
30	B	300	150	d ₂ = 25.456	17	—	
32	B	305	155	l ₁ = 123	17	—	
35	A	310	160	l ₁ = 132	—	8	

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Конус хвоста Shank taper	l_2	l_1	d_1
38	B	350	165	Морзе № 5	17	—	$d - 1.0$
40	B	355	170	Morse No. 5	17	—	
42	B	360	175	$D = 44.732$	17	—	
45	B	365	180	$d_2 = 36.549$	17	—	
48	A	370	185	$l_1 = 155.5$	—	8	
50	A	375	190	$l_1 = 164.5$	—	8	
52	A	380	195		—	8	
55	A	385	200		—	8	

1. Назначение спиральных сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.

2. Сверла диаметром от 6 до 10 мм могут изготавливаться без шейки.

3. Обозначение сверла спирального укороченного с усиленным коническим хвостом, диаметром 25 мм:

25 OCT 20182-40

1. For application of twist drills in accordance with drill diameter see table on page 42.

2. Drills from 6 to 10 mm in diameter may be made without neck.

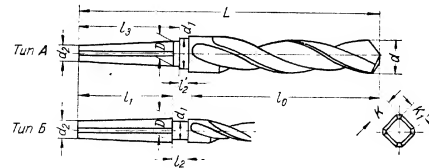
3. Designation of taper shank twist drill, short series, shank larger than regular, 25 mm diameter:

25 OST 20182-40

СВЕРЛА СПИРАЛЬНЫЕ С ЧЕТЫРЕХГРАННЫМ СУЖИВАЮЩИМСЯ
ХВОСТОМ (для трещеток)
(по OCT 20231-40)

TAPER SQUARE SHANK RATCHET DRILLS
(acc. to OST 20231-40)

Материал: инструментальная легированная сталь
Material: alloy tool steel



Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Размеры хвоста Size of shank	l_2	l_1	d_1
9.5	B	150	87	Размеры квадрата:	12	—	$d - 0.5$
10	B	150	87	Size of square:	12	—	
11	B	150	87	$K = 15$	12	—	
12	B	150	87	$K_1 = 10.8$	12	—	
13	B	160	97	$D = 19.5$	12	—	
14	B	160	97	$d_2 = 14.1$	12	—	
15	B	160	97	$l_1 = 45$	12	—	
16	B	160	97	$l_2 = 48$	12	—	
17	B	160	97		12	—	
18	B	160	97		12	—	
19	B	160	97		12	—	
20	B	160	97		12	—	
21	A	160	94		—	12	
22	A	160	94		—	12	
23	A	160	94		—	12	
24	A	160	94		—	12	
25	A	160	94		—	12	



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Размеры в мм — Dimensions in mm

d	Тип Type	L	l_0	Размеры хвоста Size of shank	l_2	l_1	d_1
26	A	170	94	Размеры	—	12	$d - 1.0$
27	A	170	94	квадрата:	—	12	
28	A	170	94	Size of square:	—	12	
29	A	170	94	$K = 17.5$	—	12	
30	A	170	94	$K_1 = 12.4$	—	12	
31	A	170	94	$D = 22.80$	—	12	
32	A	170	94	$d_2 = 16.2$	—	14	
33	A	170	91	$l_1 = 55$	—	14	
34	A	170	91	$l_2 = 58$	—	14	
35	A	170	91		—	14	
36	A	170	91		—	14	
37	A	170	91		—	14	
38	A	170	91		—	14	
39	A	170	91		—	14	
40	A	170	91		—	14	

Обозначение сверла спирального с четырехгранным суживающимся хвостом, диаметром 30 мм:

30 OCT 20231-40

Designation of taper square shank ratchet drill, 30 mm diameter:

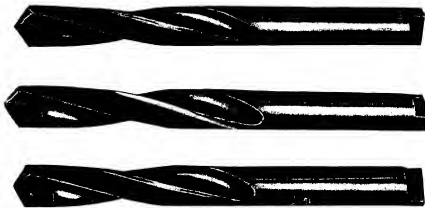
30 OST 20231-40

СВЕРЛА С ЦИЛИНДРИЧЕСКИМ ХВОСТОМ,
ОСНАЩЕННЫЕ ПЛАСТИНКАМИ ИЗ ТВЕРДОГО СПЛАВА
(Тип I по ГОСТ 6647-53)

STRAIGHT SHANK DRILLS TIPPED WITH CEMENTED CARBIDE
(Type I, acc. to GOST 6647-53)

Материал: сверла оснащаются вольфрамо-кобальтовым твердым сплавом

Material: drills are tipped with tungsten cemented carbide



Размеры в мм — Dimensions in mm

d	L	l_0
5	75	40
5.1	75	40
5.2	75	40
5.3	75	40
5.5	80	45
5.8	80	45
6	80	45

d	L	l_0
6.4	80	45
6.5	85	50
6.6	85	50
6.7	85	50
6.8	85	50
6.9	85	50
7	85	50

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



Размеры в мм — Dimensions in mm

d	L	l_0
7.1	85	50
7.2	85	50
7.6	90	53
7.7	90	53
7.8	90	53
7.9	90	53
8	90	53
8.3	90	53
8.4	90	53
8.8	95	56
8.9	95	56
9	95	56
9.1	95	56

d	L	l_0
9.2	95	56
9.7	95	56
10	100	60
10.1	100	60
10.4	100	60
10.5	100	60
10.6	100	60
10.8	100	60
11	110	65
11.7	115	70
11.8	115	70
12	115	70

1. Допускается изготовление сверл диаметром до 6 мм с наружным центром.

2. Обозначение сверла типа I диаметром 6 мм, оснащенного пластинками из твердого сплава БК:

6 BK I ГОСТ 6647-53

1. Shanks of drills up to 6 mm in diameter may be made with external center.

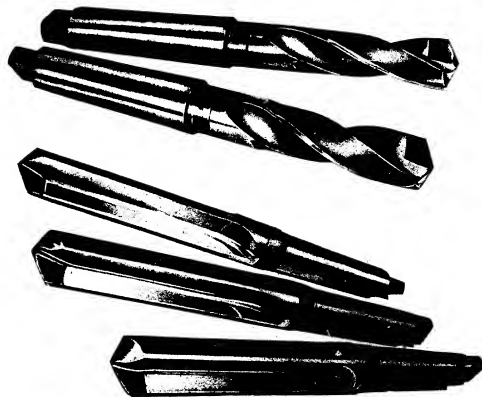
2. Designation of type I straight shank drill tipped with cemented carbide BK, 6 mm diameter:

6 BK I GOST 6647-53

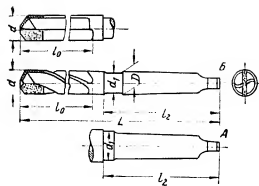
**СВЕРЛА С КОНИЧЕСКИМ ХВОСТОМ,
ОСНАЩЕННЫЕ ПЛАСТИНКАМИ ИЗ ТВЕРДОГО СПЛАВА**
(Тип II по ГОСТ 6647-53)

TAPER SHANK DRILLS TIPPED WITH CEMENTED CARBIDE
(Type II, acc. to GOST 6647-53)

Материал: сверла оснащаются вольфрамо-кобальтовым твердым сплавом
Material: drills are tipped with tungsten cemented carbide



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Размеры в мм — Dimensions in mm

d	Форма хвоста Type of shank	L		l ₀		l ₂	d ₁	Конус хвоста Shank taper
		для длинных long series	для укороченных short series	для длинных long series	для укороченных short series			
6	B	160	120	78	35	77.5	d - 0.7	Морзе № 1
6.4	B	160	120	78	35	77.5		
6.5	B	160	120	78	35	77.5		
6.6	B	160	120	78	35	77.5		
6.7	B	160	120	78	35	77.5		
6.8	B	160	120	78	35	77.5		
6.9	B	160	120	78	35	77.5		
7	B	165	125	83	40	77.5		
7.1	B	165	125	83	40	77.5		
7.2	B	165	125	83	40	77.5		
7.5	B	165	125	83	40	77.5	d - 0.8	Морзе № 2
7.6	B	165	125	83	40	77.5		
7.7	B	165	125	83	40	77.5		
7.8	B	165	125	83	40	77.5		
7.9	B	165	125	83	40	77.5		
8	B	170	130	88	45	77.5		
8.3	B	170	130	88	45	77.5		
8.4	B	170	130	88	45	77.5		
8.8	B	170	130	88	45	77.5		
8.9	B	170	130	88	45	77.5		
9.1	B	175	135	93	50	77.5	d - 1	Морзе № 3
9.2	B	175	135	93	50	77.5		
9.7	B	175	135	93	50	77.5		
10	B	180	140	98	55	77.5		
10.1	B	180	140	98	55	77.5		
10.4	B	180	140	98	55	77.5		
10.5	B	180	140	98	55	77.5		
10.6	B	180	140	98	55	77.5		
10.8	B	180	140	98	55	77.5		
11	B	185	145	103	60	77.5		
11.7	B	185	145	103	60	77.5	d - 0.8	Морзе № 2
11.8	B	185	145	103	60	77.5		

37

Размеры в мм — Dimensions in mm

d	Форма хвоста Type of shank	L		l ₀		l ₂	d ₁	Конус хвоста Shank taper
		для длинных long series	для укороченных short series	для длинных long series	для укороченных short series			
12	B	205	165	110	63	90.5	d - 0.8	Морзе № 2
12.3	B	205	165	110	63	90.5		
12.4	B	205	165	110	63	90.5		
12.7	B	205	165	110	63	90.5		
12.8	B	205	165	110	63	90.5		
13	B	210	170	115	68	90.5		
13.3	B	210	170	115	68	90.5		
13.5	B	210	170	115	68	90.5		
13.7	B	210	170	115	68	90.5		
13.8	B	210	170	115	68	90.5		
14	B	215	175	120	71	90.5	d - 0.8	Морзе № 2
14.3	B	215	175	120	71	90.5		
14.4	B	215	175	120	71	90.5		
14.5	B	215	175	120	71	90.5		
14.7	B	215	175	120	71	90.5		
14.8	B	215	175	120	71	90.5		
15	B	220	180	125	76	90.5		
15.1	B	220	180	125	76	90.5		
15.3	B	220	180	125	76	90.5		
15.6	B	225	180	130	80	90.5		
16	B	225	180	130	80	90.5	d - 0.8	Морзе № 2
16.3	B	225	180	130	80	90.5		
16.4	B	225	180	130	80	90.5		
16.6	B	225	180	130	80	90.5		
16.8	B	225	180	130	80	90.5		
17	B	230	185	135	85	90.5		
17.1	B	230	185	135	85	90.5		
17.3	B	230	185	135	85	90.5		
17.6	B	230	185	135	85	90.5		
18	B	235	190	140	90	90.5	d - 0.8	Морзе № 2
18.3	B	235	190	140	90	90.5		
18.6	A; B	235	190	140	90	90.5		
18.8	A; B	235	190	140	90	90.5		
19	B	265	220	155	95	113	d - 1	Морзе № 3
19.1	B	265	220	155	95	113		
19.3	B	265	220	155	95	113		
19.6	B	265	220	155	95	113		
20	B	270	225	160	100	113		
20.3	B	270	225	160	100	113		
20.4	B	270	225	160	100	113		
20.6	B	270	225	160	100	113		
20.7	B	270	225	160	100	113		
20.8	B	270	225	160	100	113		
21	B	275	225	165	100	113	d - 0.8	Морзе № 2
21.6	B	275	225	165	100	113		
21.7	B	275	225	165	100	113		
21.8	B	275	225	165	100	113		

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ

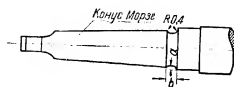


Размеры в мм — Dimensions in mm

d	Форма хвоста Type of shank	L		l ₀		l ₂	d ₁	Конус хвоста Shank taper
		для длинных long series	для укороченных short series	для длинных long series	для укороченных short series			
21.9	B	275	225	155	100	113	d - 1	Морзе № 3 Morse No. 3
22	B	280	230	160	105	113		
22.3	B	280	230	160	105	113		
22.6	B	280	230	160	105	113		
23	B	285	230	165	105	113		D - 1
23.5	B	285	230	165	105	113		
23.6	B	290	235	170	108	113		
23.7	B	290	235	170	108	113		
24	A, B	290	235	170	108	113		Форма А Type A d - 1 Форма В Type B D - 1.2
24.6	A, B	290	235	170	108	113		
24.7	A, B	290	235	170	108	113		
24.8	A, B	290	235	170	108	113		
25	A, B	295	235	175	112	113		d - 1.2
25.3	A, B	295	235	175	112	113		
25.6	A, B	295	235	175	112	113		
26	A, B	300	240	180	112	113		
26.1	A	300	240	180	112	113		Морзе № 4 Morse No. 4
27	A	305	245	185	112	113		
27.6	B	335	260	185	112	140		
27.8	B	335	260	185	112	140		
27.9	B	335	260	185	112	140		
28	B	340	265	190	118	140		
28.3	B	340	265	190	118	140		
29	B	345	265	195	118	140		
29.2	B	345	265	195	118	140		
29.6	B	345	265	195	118	140		
30	B	350	270	200	122	140		

1. Сверла с коническим хвостом изготавливаются с длинной или укороченной рабочей частью.

2. Сверла с хвостом формы А могут быть изготовлены с канавкой для выхода шлифовального круга согласно рисунку.



Размеры в мм

d	Конус хвоста	a	b
18,6—18,8	Морзе № 2	0,3—0,4	3,0
24,6—27	Морзе № 3	0,5—0,6	3,0

3. Сверла изготавливаются с винтовыми канавками.

По требованию заказчика допускается изготовление сверл с прямыми канавками.

4. Пластины твердого сплава формы 14 и размеры их — по ГОСТ 2209-49.

5. Назначение сверл по диаметрам — см. „Таблицу назначения сверл“, стр. 42.

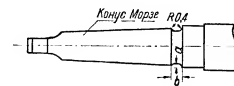
6. Обозначение сверла типа II с длинной рабочей частью диаметром 20 мм, оснащенного пластинами из твердого сплава BK:

20 BK II ГОСТ 6647-53

То же, с укороченной рабочей частью:

У 20 BK II ГОСТ 6647-53

1. Taper shank drills are made with both long and short length of twist.
2. Drills with A type of shank may be made with a recess providing a way for the grinding wheel according to sketch.



Dimensions in mm

d	Taper shank	a	b
18.6—18.8	Morse No. 2	0.3—0.4	3.0
24.6—27	Morse No. 3	0.5—0.6	3.0

3. Drills are made with helical flutes. On customer's demand drills may be furnished with straight flutes.

4. For carbide tips of type 14 and their dimensions see GOST 2209-49.

5. For application of drills in accordance with drill diameter see table on page 42.

6. Designation of type II taper shank drill with long length of twist tipped with cemented carbide BK, 20 mm diameter:

20 BK II GOST 6647-53

Same with short length of twist:

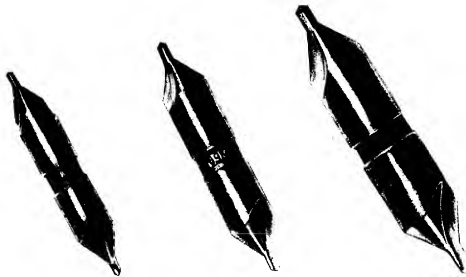
У 20 BK II GOST 6647-53



СВЕРЛА ЦЕНТРОВОЧНЫЕ 60° КОМБИНИРОВАННЫЕ ДЛЯ
ЦЕНТРОВЫХ ОТВЕРСТИЙ БЕЗ ПРЕДОХРАНИТЕЛЬНОГО КОНУСА
(по OST 3732)

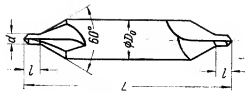
60° COMBINED DRILLS AND COUNTERSINKS
(acc. to OST 3732)

Материал: быстрорежущая сталь
Material: high speed steel



Размеры в мм — Dimensions in mm

d	D_0	L	l
1	5	45	1.8
1.5	7	50	2.6
2	8	55	3.4
2.5	10	60	4.2
3	12	65	5
4	14	75	6.5
5	18	90	8
6	22	105	9.5



Обозначение центровочного комбинированного сверла для центрового
отверстия по OST 3725 диаметром $d = 2.5$ мм:

60° × 2.5 OST 3732

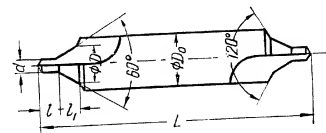
Designation of 60° combined drill and countersinks for center hole acc. to
OST 3725, $d = 2.5$ mm:

60° × 2.5 OST 3732

СВЕРЛА ЦЕНТРОВОЧНЫЕ 60° КОМБИНИРОВАННЫЕ ДЛЯ
ЦЕНТРОВЫХ ОТВЕРСТИЙ С ПРЕДОХРАНИТЕЛЬНЫМ КОНУСОМ
(по OST 3733)

60° PROTECTED CENTER COMBINED DRILLS AND COUNTERSINKS
(acc. to OST 3733)

Материал: быстрорежущая сталь
Material: high speed steel



Размеры в мм — Dimensions in mm

d	D_0	D	L	l	l_1
1	5	2.5	45	1.8	1.3
1.5	7	4	50	2.6	2.2
2	8	5	55	3.4	2.6
2.5	10	6	60	4.2	3
3	12	7.5	65	5	3.9
4	14	10	75	6.5	5.2
5	18	12.5	90	8	6.5
6	22	15	105	9.5	7.8

Обозначение центровочного комбинированного сверла для центрового
отверстия с предохранительным конусом по OST 3725 диаметром
 $d = 2.5$ мм:

60° × 2.5 OST 3733

Designation of 60° protected center combined drill and countersink for
center hole acc. to OST 3725, $d = 2.5$ mm:

60° × 2.5 OST 3733

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ

СТАНКОИМПОРТ



Размеры в мм — Dimensions in mm

[illegible][illegible]

Размеры в мм — Dimensions in mm

Номинальный ряд диаметров Nominal diameters	Диаметры сверл — Drill diameters									
	Черепашка на проход — Through drilling					Черепашка под резьбу — Tap drills for				
	Точная сборка — Fine assembly					1-й класс — Class 1				
	1-й класс — Class 1	2-й класс — Class 2	1-й класс — Class 1	2-й класс — Class 2	1-й класс — Class 1	2-й класс — Class 2	1-й класс — Class 1	2-й класс — Class 2	1-й класс — Class 1	2-й класс — Class 2
24	24,6	25	26	27	28	29	30	31	32	33
25	25,6	26	27	28	29	30	31	32	33	34
26	26,6	27	28	29	30	31	32	33	34	35
27	27,6	28	29	30	31	32	33	34	35	36
28	28,6	29	30	31	32	33	34	35	36	37
29	29,6	30	31	32	33	34	35	36	37	38
30	30,6	31	32	33	34	35	36	37	38	39
31	31,6	32	33	34	35	36	37	38	39	40
32	32,6	33	34	35	36	37	38	39	40	41
33	33,6	34	35	36	37	38	39	40	41	42
34	34,6	35	36	37	38	39	40	41	42	43
35	35,6	36	37	38	39	40	41	42	43	44
36	36,6	37	38	39	40	41	42	43	44	45
37	37,6	38	39	40	41	42	43	44	45	46
38	38,6	39	40	41	42	43	44	45	46	47
39	39,6	40	41	42	43	44	45	46	47	48
40	40,6	41	42	43	44	45	46	47	48	49



40	40,6	41	42	43	44	45	46	47	48	49	50
41	41,6	42	43	44	45	46	47	48	49	50	51
42	42,6	43	44	45	46	47	48	49	50	51	52
43	43,6	44	45	46	47	48	49	50	51	52	53
44	44,6	45	46	47	48	49	50	51	52	53	54
45	45,6	46	47	48	49	50	51	52	53	54	55
46	46,6	47	48	49	50	51	52	53	54	55	56
47	47,6	48	49	50	51	52	53	54	55	56	57
48	48,6	49	50	51	52	53	54	55	56	57	58
49	49,6	50	51	52	53	54	55	56	57	58	59
50	50,6	51	52	53	54	55	56	57	58	59	60
51	51,6	52	53	54	55	56	57	58	59	60	61
52	52,6	53	54	55	56	57	58	59	60	61	62
53	53,6	54	55	56	57	58	59	60	61	62	63
54	54,6	55	56	57	58	59	60	61	62	63	64
55	55,6	56	57	58	59	60	61	62	63	64	65
56	56,6	57	58	59	60	61	62	63	64	65	66
57	57,6	58	59	60	61	62	63	64	65	66	67
58	58,6	59	60	61	62	63	64	65	66	67	68
59	59,6	60	61	62	63	64	65	66	67	68	69
60	60,6	61	62	63	64	65	66	67	68	69	70
61	61,6	62	63	64	65	66	67	68	69	70	71
62	62,6	63	64	65	66	67	68	69	70	71	72
63	63,6	64	65	66	67	68	69	70	71	72	73
64	64,6	65	66	67	68	69	70	71	72	73	74
65	65,6	66	67	68	69	70	71	72	73	74	75
66	66,6	67	68	69	70	71	72	73	74	75	76
67	67,6	68	69	70	71	72	73	74	75	76	77
68	68,6	69	70	71	72	73	74	75	76	77	78
69	69,6	70	71	72	73	74	75	76	77	78	79
70	70,6	71	72	73	74	75	76	77	78	79	80
71	71,6	72	73	74	75	76	77	78	79	80	81
72	72,6	73	74	75	76	77	78	79	80	81	82
73	73,6	74	75	76	77	78	79	80	81	82	83
74	74,6	75	76	77	78	79	80	81	82	83	84
75	75,6	76	77	78	79	80	81	82	83	84	85
76	76,6	77	78	79	80	81	82	83	84	85	86
77	77,6	78	79	80	81	82	83	84	85	86	87
78	78,6	79	80	81	82	83	84	85	86	87	88
79	79,6	80	81	82	83	84	85	86	87	88	89
80	80,6	81	82	83	84	85	86	87	88	89	90
81	81,6	82	83	84	85	86	87	88	89	90	91
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83	83,6	84	85	86	87	88	89	90	91	92	93
84	84,6	85	86	87	88	89	90	91	92	93	94
85	85,6	86	87	88	89	90	91	92	93	94	95
86	86,6	87	88	89	90	91	92	93	94	95	96
87	87,6	88	89	90	91	92	93	94	95	96	97
88	88,6	89	90	91	92	93	94	95	96	97	98
89	89,6	90	91	92	93	94	95	96	97	98	99
90	90,6	91	92	93	94	95	96	97	98	99	100
91	91,6	92	93	94	95	96	97	98	99	100	101
92	92,6	93	94	95	96	97	98	99	100	101	102
93	93,6	94	95	96	97	98	99	100	101	102	103
94	94,6	95	96	97	98	99	100	101	102	103	104
95	95,6	96	97	98	99	100	101	102	103	104	105
96	96,6	97	98	99	100	101	102	103	104	105	106
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98	98,6	99	100	101	102	103	104	105	106	107	108
99	99,6	100	101	102	103	104	105	106	107	108	109
100	100,6	101	102	103	104	105	106	107	108	109	110
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102	102,6	103	104	105	106	107	108	109	110	111	112
103	103,6	104	105	106	107	108	109	110	111	112	113
104	104,6	105	106	107	108	109	110	111	112	113	114
105	105,6	106	107	108	109	110	111	112	113	114	115
106	106,6	107	108	109	110	111	112	113	114	115	116
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110	110,6	111	112	113	114	115	116	117	118	119	120
111	111,6	112	113	114	115	116	117	118	119	120	121
112	112,6	113	114	115	116	117	118	119	120	121	122
113	113,6	114	115	116	117	118	119	120	121	122	123
114	114,6	115	116	117	118	119	120	121	122	123	124
115	115,6	116	117	118	119	120	121	122	123	124	125
116	116,6	117	118	119	120	121	122	123	124	125	126
117	117,6	118	119	120	121	122	123	124	125	126	127
118	118,6	119	120	121	122	123	124	125	126	127	128
119	119,6	120	121	122	123	124	125	126	127	128	129
120	120,6	121	122	123	124	125	126	127	128	129	130
121	121,6	122	123	124	125	126	127	128	129	130	131
122	122,6	123	124	125	126	127	128	129	130	131	132
123	123,6	124	125	126	127	128	129	130	131	132	133
124	124,6	125	126	127	128	129	130	131	132	133	134
125	125,6	126	127	128	129	130	131	132	133	134	135
126	126,6	127	128	129	130	131	132	133	134	135	136
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128	128,6	129	130	131	132	133	134	135	136	137	138
129	129,6	130	131	132	133	134	135	136	137	138	139
130	130,6	131	132	133	134	135	136	137	138	139	140
131	131,6	132	133	134	135	136	137	138	139	140	141
132	132,6	133	134	135	136	137	138	139	140	141	142
133	133,6	134	135	136	137	138	139	140	141	142	143
134	134,6	135	136	137	138	139	140	141	142	143	144
135	135,6	136	137	138	139	140	141	142	143	144	145
136	136,6	137	138	139	140	141	142	143	144	145	146
137	137,6	138	139	140	141	142	143	144	145	146	147
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140	140,6	141	142	143	144	145	146	147	148	149	150
141	141,6	142	143	144	145	146	147	148	149	150	151
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147	147,6	148	149	150	151	152	153	154	155	156	157
148	148,6	149	150	151	152	153	154	155	156	157	158
149	149,6	150	151	152	153	154	155	156	157	158	159
150	150,6	151	152	153	154	155	156	157	158	159	160
151	151,6	152	153	154	155	156	157	158	159	160	161
152	152,6	153	154	155	156	157	158	159	160	161	162
153	153,6	154	155	156	157	158	159	160	161	162	163
154	154,6	155	156	157	158	159	160	161	162	163	164
155	155,6	156	157	158	159	160	161	162	163	164	165
156	156,6	157	158	159	160	161	162	163	164	165	166
157	157,6	158	159	160	161	162	163	164	165	166	167
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159	159,6	160	161	162	163	164	165	166	167	168	169
160	160,6	161	162	163	164	165	166	167	168	169	170
161	161,6	162	163	164	165	166	167	168	169	170	171
162	162,6	163	164	165	166	167	168	169	170	171	172
163	163,6	164	165	166	167	168	169	170	171	172	173
164	164,6	165	166	167	168	169	170	171	172	173	174
165	165,6	166	167	168	169	170	171	172	173	174	175
166	166,6	167	168	169	170	171	172	173	174	175	176
167	167,6	168	169	170	171	172	173	174	175	176	

3. В графах „Точная сборка“ указаны диаметры сверл, предназначенных для точной механики и приборостроения (сборка 1-я) и для машиностроения, станкостроения и т.д. (сборка 2-я).

4. В графах „Грубая сборка“ указаны диаметры сверл, предназначенных как для машиностроения, так и для других отраслей промышленности.

5. В графе „Сверление под зенкер“ указаны диаметры сверл, предназначенных для выполнения отверстий сверлом и зенкером, и в сверлом, зенкером и разверткой.

6. В графе „Сверление под развертку или шлифовку“ указаны диаметры сверл, предназначенных для выполнения отверстий сверлом и разверткой или сверлом с последующей шлифовкой.

7. В графах „Сверление под резьбу“ указаны диаметры сверл, предназначенных для сверления в материалах, не дающих большого подтека литья резьбы (I), и в материалах, дающих повышенный подтек резьбы (II).

8. Отверстия под метрические резьбы, 1-ю и 2-ю мелкие, начиная с диаметра 24 мм и выше, а также все отверстия под 3-ю и 4-ю мелкие — выполняются чистовым рассверливанием или зенкерованием после сверления.

3. Column „Fine assembly“ gives diameters of drills designed for the precision engineering and instrument making industries (class 1) and for the mechanical engineering, machine tool and other industries (class 2).

4. Column „Rough assembly“ gives diameters of drills designed for the mechanical engineering and other branches of industry.

5. Column „Drills leaving a stock in hole for counterboring“ shows diameters of drills designed for holes to be machined either with a drill and counterbore or with a drill, counterbore and reamer.

6. Column „Drills leaving a stock in hole for reaming or grinding“ shows diameters of drills designed for holes to be machined either with a drill and reamer or with a drill and next grinding.

7. Column „Tap drills“ shows diameters of drills designed for drilling either in metals which do not flow enough (I) or in metals with a considerable flow (II).

8. Holes larger than 24 mm in diameter for Metric thread and fine Metric threads, series 1 and 2 as well as all holes for fine Metric threads, series 3 and 4, are machined either with two drills or with a counterbore after drilling.

ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ

„СТАНКОИМПОРТ“

ЭКСПОРТИРУЕТ И ИМПОРТИРУЕТ:

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Измерительные приборы и инструменты
Приборы и машины для испытания металлов
Оптические приборы и инструменты
Ручной электрический и пневматический инструмент
Режущий инструмент по металлу и дереву
Слесарно-монтажный инструмент и зажимные патроны
Изделия из твердых сплавов
Абразивные изделия
Шариковые и роликовые подшипники
Микроскопы различных типов
Кинооборудование и киноаппаратуру
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Фотоаппаратуру, бинокли, лупы, линзы
Сырое оптическое стекло

С запросами на все товары, относящиеся к номенклатуре В/О „Станкоимпорт“, и за дополнительными сведениями просим обращаться по адресу:
Москва, 200, Смоленская-Сенная пл., 32/34

ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ
„СТАНКОИМПОРТ“

Телеграфный адрес: Москва Станкоимпорт

Конструкции и технические характеристики инструмента, приведенного в каталоге, могут быть изменены без дополнительной информации



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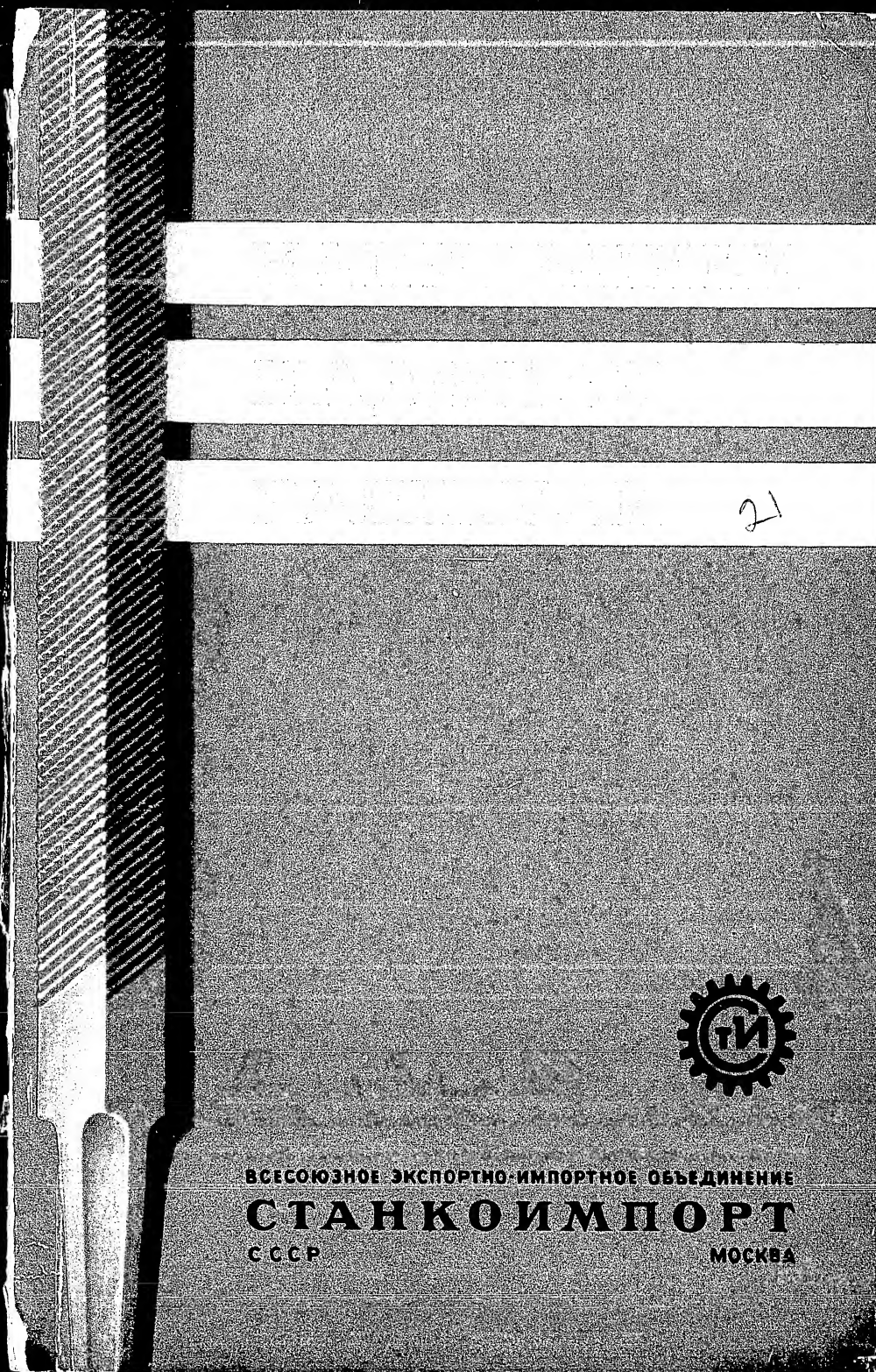
32/34, Smolenskaja-Sennaja pl., Moscow, U.S.S.R.

For cables: Stankoimport Moscow

Design and specifications of the tools illustrated herein are subject
to change without notice

Заказ № 2434. Внешторгиздат

ВСЕСОЮЗНОЕ ОБЪЕДИНЕНИЕ



НАПИЛЬНИКИ
НАДФИЛИ
РАШПИЛИ

FILES
NEEDLE FILES
RASPS

50X1-HUM

С С С Р



МОСКВА

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Поставляемые В О «Станкоимпорт» напильники изготовлены из лучших сортов стали с соответствующей термической обработкой, что обеспечивает им отличную стойкость.

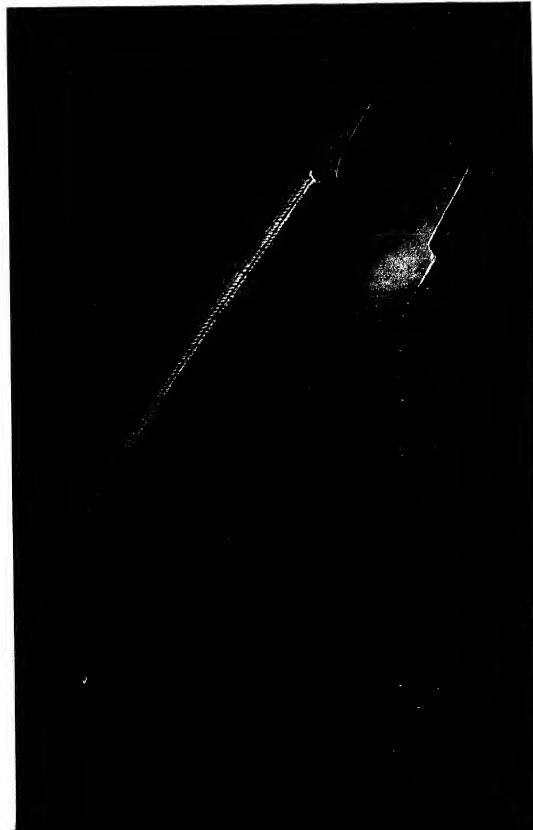
Напильники отвечают всем современным требованиям как в отношении геометрии режущих элементов, так и в отношении качества их отделки.

The Files and Rasps furnished by V/O «Stankoimport» are manufactured of the best grades of carbon tool steel and undergo suitable heat treatment. This provides for long file life.

Geometry of cutting elements and the finish of the files meet all up-to-date requirements.

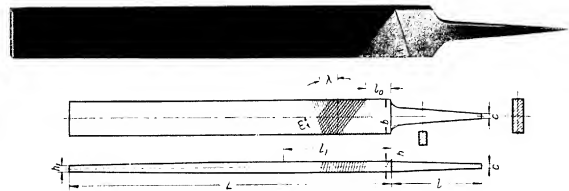
НАПИЛЬНИКИ

FILES



**НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 1**
(по ГОСТ 1465-53)

HAND FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm								l^*	m^*	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	l	h	h_1	l_1	l_2	l_3	e			
100	12	3,5	2	40	15	50	1,5	20	55	13
125	15	4	2,5	50	15	63	2	20	55	11
150	18	5	3	60	15	75	2	20	55	11
200	22	6	3,5	80	20	100	2,5	20	55	10
250	26	8	5	70	20	125	2,5	20	55	9
300	30	9	5,5	80	20	150	3	20	55	8
350	35	10	6	90	25	175	3	20	55	7
400	40	11	6,5	100	25	200	3,3	20	55	6
450	45	12	7	100	30	225	3,5	20	55	5

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может изготовиться с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 1:

Напильн. плоск. тупон. 150 № 1 ГОСТ 1465-53.

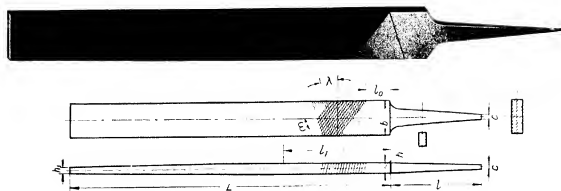
1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

2. Designation of a hand file 150 mm working length, No. 1 cut:
Hand file 150 No. 1 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 2
(по ГОСТ 1465-53)

HAND FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.

Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	c			
100	12	3,5	2	40	15	50	1,5	20	55	25
125	15	4	2,5	50	15	63	2	20	55	22
150	18	5	3	50	15	75	2	20	55	22
200	22	6	3,5	60	20	100	2,5	20	55	20
250	26	8	5	70	20	125	2,5	20	55	18
300	30	9	5,5	80	20	150	3	20	55	16
350	35	10	6	90	25	175	3	20	55	14
400	40	11	6,5	100	25	200	3,5	20	55	13

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может изготовиться с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 2:

Напильн. плоск. тупоно. 150 № 2 ГОСТ 1465-53.

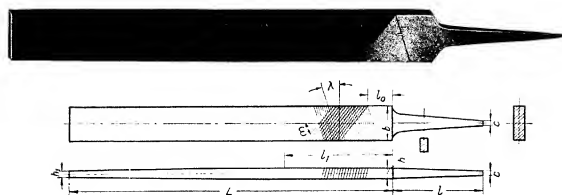
1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

2. Designation of a hand file, 150 mm working length, No. 2 cut:
Hand file 150 No. 2 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 3
(по ГОСТ 1465-53)

HAND FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.

Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	c			
100	9	3	1,5	40	15	33	1,5	20	55	40
150	15	4	2	50	15	50	2	20	55	36
200	18	5	2,5	60	20	67	2,5	20	55	32
250	22	6	3	70	20	83	2,5	20	55	28
300	26	8	4	80	20	100	3	20	55	25

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может изготовиться с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 3:

Напильн. плоск. тупоно. 150 № 3 ГОСТ 1465-53.

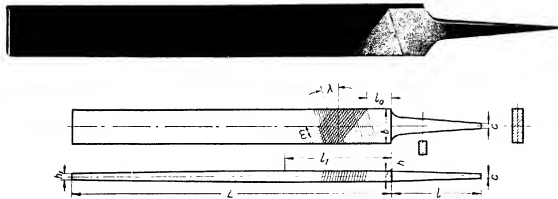
1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

2. Designation of a hand file, 150 mm working length, No. 3 cut:
Hand file 150 No. 3 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 4
(по ГОСТ 1465-53)

HAND FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ϕ°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	c			
100	9	3	1,5	40	15	33	1,5	20	55	56
150	15	4	2	50	15	50	2	20	55	50
200	18	5	2,5	60	20	67	2,5	20	55	45
250	22	6	3	70	20	83	2,5	20	55	40

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может изготавливаться с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 4:

Напильн. плоск. тупон. 150 № 4 ГОСТ 1465-53.

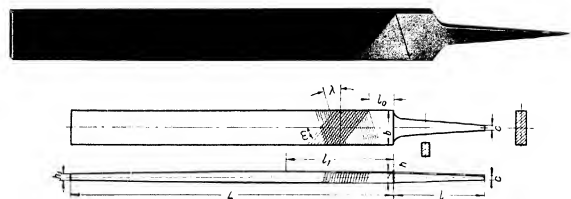
1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

2. Designation of a hand file, 150 mm working length, No. 4 cut:
Hand file 150 No. 4 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 5
(по ГОСТ 1465-53)

HAND FILES, No. 5 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ϕ°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	c			
100	9	3	1,5	40	15	33	1,5	20	55	71
150	15	4	2	50	15	50	2	20	55	63
200	18	5	2,5	60	20	67	2,5	20	55	56

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может быть изготовлена с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 5:

Напильн. плоск. тупон. 150 № 5 ГОСТ 1465-53.

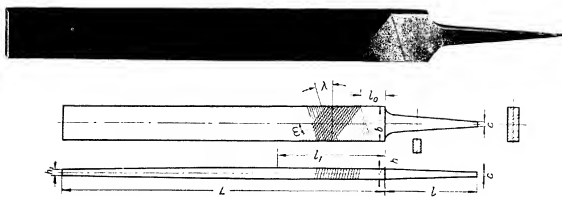
1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

2. Designation of a hand file, 150 mm working length, No. 5 cut:
Hand file 150 No. 5 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ТУПОНОСЫЕ
с насечкой № 6
(по ГОСТ 1465-53)

HAND FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	c			
100	9	3	1,5	40	15	33	1,5	20	55	80
150	15	4	2	50	15	50	2	20	55	71

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. Другая узкая сторона напильника не имеет насечек.

По специальному заказу узкая сторона может быть изготовлена с двойной насечкой.

2. Обозначение плоского тупоносого напильника с длиной рабочей части 150 мм, с насечкой № 6:

Напильн. плоск. тупон. 150 № 6 ГОСТ 1465-53.

1. Files have one single cut edge, the other being left safe (uncut). The number of teeth on edge is the same as the number of overcut teeth on the file sides. On special order files may be furnished with a double cut edge.

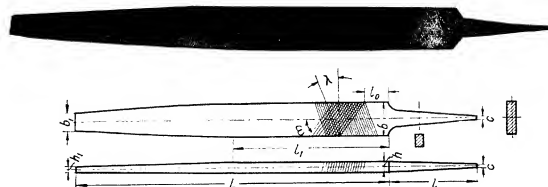
2. Designation of a hand file, 150 mm working length, No. 6 cut:

Hand file 150 No. 6 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ
с насечкой № 1
(по ГОСТ 1465-53)

FLAT FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁			
100	12	6	3,5	2	40	15	50	1,5	20	55
150	18	9	5	3	50	15	75	2	20	55
200	22	11	6	3,5	60	20	100	2,5	20	55
250	26	13	8	5	70	20	125	2,5	20	55
300	30	15	9	5,5	80	20	150	3	20	55
350	35	17,5	10	6	90	25	175	3	20	55
400	40	20	11	6,5	100	25	200	3,5	20	55
450	45	22,5	12	7	100	30	225	3,5	20	55

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 1:

Напильн. плоск. острон. 150 № 1 ГОСТ 1465-53.

1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.

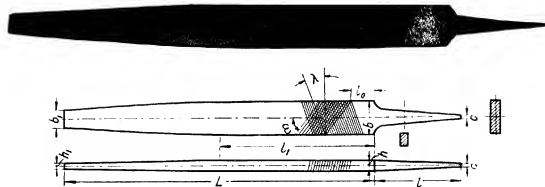
2. Designation of a flat file, 150 mm working length, No. 1 cut:

Flat file 150 No. 1 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ
с насечкой № 2
(по ГОСТ 1465-53)

FLAT FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	12	6	3,5	2	40	15	50	1,5	20	55	25
150	18	9	5	3	50	15	75	2	20	55	22
200	22	11	6	3,5	60	20	100	2,5	20	55	20
250	26	13	8	5	70	20	125	2,5	20	55	18
300	30	15	9	5,5	80	20	150	3	20	55	16
350	35	17,5	10	6	90	25	175	3	20	55	14
400	40	20	11	6,5	100	25	200	3,5	20	55	13

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 2:

Напильн. плоск. остронос. 150 № 2 ГОСТ 1465-53.

1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.

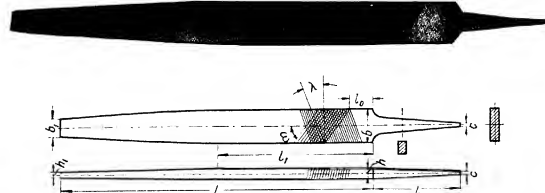
2. Designation of a flat file, 150 mm working length, No. 2 cut:

Flat file 150 No. 2 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ
с насечкой № 3
(по ГОСТ 1465-53)

FLAT FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	9	3	3	1,5	40	15	33	1,5	20	55	40
150	15	5	4	2	50	15	50	2	20	55	36
200	18	6	5	2,5	60	20	67	2,5	20	55	32
250	22	7	6	3	70	20	83	2,5	20	55	28
300	26	9	8	4	80	20	100	3	20	55	25

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 3:

Напильн. плоск. остронос. 150 № 3 ГОСТ 1465-53.

1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.

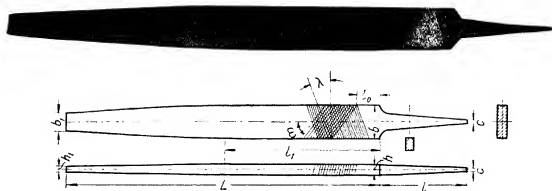
2. Designation of a flat file, 150 mm working length, No. 3 cut:

Flat file 150 No. 3 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ
с насечкой № 4
(по ГОСТ 1465-53)

FLAT FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm										α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₁	c					
100	9	3	3	1,5	40	15	33	1,5	20	55		56
150	15	5	4	2	50	15	50	2	20	55		50
200	18	6	5	2,5	60	20	67	2,5	20	55		45
250	22	7	6	3	70	20	83	2,5	20	55		40

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 4:

Напильн. плоск. острон. 150 № 4 ГОСТ 1465-53.

1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.

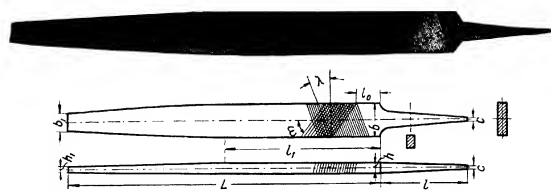
2. Designation of a flat file, 150 mm working length, No. 4 cut:

Flat file 150 No. 4 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ
с насечкой № 5
(по ГОСТ 1465-53)

FLAT FILES, No. 5 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm										α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₁	c					
100	9	3	3	1,5	40	15	33	1,5	20	55		71
150	15	5	4	2	50	15	50	2	20	55		63
200	18	6	5	2,5	60	20	67	2,5	20	55		56

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 5:

Напильн. плоск. острон. 150 № 5 ГОСТ 1465-53.

1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.

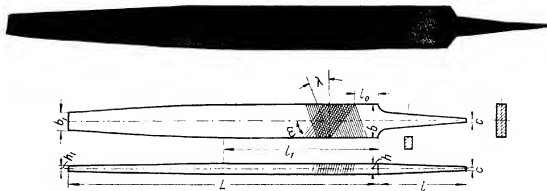
2. Designation of a flat file, 150 mm working length, No. 5 cut:

Flat file 150 No. 5 GOST 1465-53.



НАПИЛЬНИКИ ПЛОСКИЕ ОСТРОНОСЫЕ.
с насечкой № 6
(по ГОСТ 1465-53)

FLAT FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	9	3	3	1,5	40	15	33	1,5	20	55	80
150	15	5	4	2	50	15	50	2	20	55	71

1. Одна из узких сторон напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон. По специальному заказу напильники могут быть изготовлены с насечкой на обеих узких сторонах.

2. Обозначение плоского остроносого напильника с длиной рабочей части 150 мм, с насечкой № 6:

Напильн. плоск. остронос. 150 № 6 ГОСТ 1465-53.

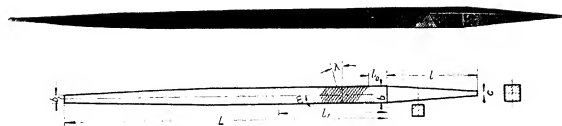
1. Files have one single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides. On special order files may be furnished cut on both edges.
2. Designation of a flat file, 150 mm working length, No. 6 cut:

Flat file 150 No. 6 GOST 1465-53.



НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 1
(по ГОСТ 1465-53)

SQUARE FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm								λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c				
100	4	2	40	15	50	1,5	20	55		13
125	5	2,5	50	15	63	2	20	55		11
150	6	3	50	15	75	2	20	55		11
200	8	4	60	20	100	2,5	20	55		10
250	10	5	70	20	125	2,5	20	55		9
300	13	6,5	80	20	150	3	20	55		8
350	16	8	90	25	175	3	20	55		7
400	19	9,5	100	25	200	3,5	20	55		6
450	22	11	100	30	225	3,5	20	55		5

Обозначение квадратного напильника с длиной рабочей части 150 мм, с насечкой № 1:

Напильн. квадратн. 150 № 1 ГОСТ 1465-53.

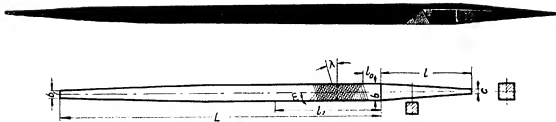
Designation of a square file, 150 mm working length, No. 1 cut:

Square file 150 No. 1 GOST 1465-53.



**НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 2**
(по ГОСТ 1465-53)

SQUARE FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	2	40	15	50	1,5	20	55	25
125	5	2,5	50	15	63	2	20	55	22
150	6	3	50	15	75	2	20	55	22
200	8	4	60	20	100	2,5	20	55	20
250	10	5	70	20	125	2,5	20	55	18
300	13	6,5	80	20	150	3	20	55	16
350	16	8	90	25	175	3	20	55	14
400	19	9,5	100	25	200	3,5	20	55	13

Обозначение квадратного напильника с длиной рабочей части 150 мм,
с насечкой № 2:

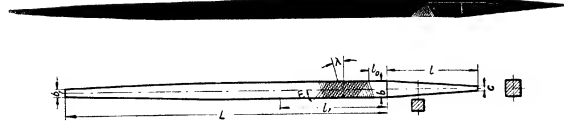
Напильн. квадрати. 150 № 2 ГОСТ 1465-53.

Designation of a square file, 150 mm working length, No. 2 cut:
Square file 150 No. 2 GOST 1465-53.



**НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 3**
(по ГОСТ 1465-53)

SQUARE FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	15	33	1,5	20	55	40
150	5	1,5	50	15	50	2	20	55	36
200	6	2	60	20	67	2,5	20	55	32
250	8	3	70	20	83	2,5	20	55	28
300	10	3,5	80	20	100	3	20	55	25

Обозначение квадратного напильника с длиной рабочей части 150 мм,
с насечкой № 3:

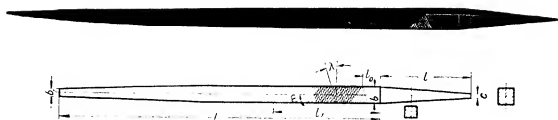
Напильн. квадрати. 150 № 3 ГОСТ 1465-53.

Designation of a square file, 150 mm working length, No. 3 cut:
Square file 150 No. 3 GOST 1465-53.



**НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 4**
(по ГОСТ 1465-53)

SQUARE FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	15	33	1,5	20	55	56
150	5	1,5	50	15	50	2	20	55	50
200	6	2	60	20	67	2,5	20	55	45
250	8	3	70	20	83	2,5	20	55	40

Обозначение квадратного напильника с длиной рабочей части 150 мм,
с насечкой № 4:

Напильн. квадратн. 150 № 4 ГОСТ 1465-53.

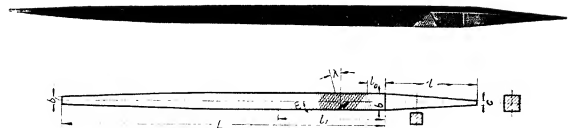
Designation of a square file, 150 mm working length, No. 4 cut:

Square file 150 No. 4 GOST 1465-58.



**НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 5**
(по ГОСТ 1465-53)

SQUARE FILES, No. 5 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	15	33	1,5	20	55	71
150	5	1,5	50	15	50	2	20	55	63
200	6	2	60	20	67	2,5	20	55	56

Обозначение квадратного напильника с длиной рабочей части 150 мм,
с насечкой № 5:

Напильн. квадратн. 150 № 5 ГОСТ 1465-53.

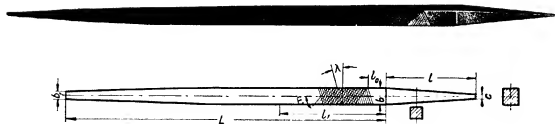
Designation of a square file, 150 mm working length, No. 5 cut:

Square file 150 No. 5 GOST 1465-58.



НАПИЛЬНИКИ КВАДРАТНЫЕ
с насечкой № 6
(по ГОСТ 1465-53)

SQUARE FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	15	33	1,5	20	55	80
150	5	1,5	50	15	50	2	20	55	71

Обозначение квадратного напильника с длиной рабочей части 150 мм,
с насечкой № 6:

Напильн. квадратн. 150 № 6 ГОСТ 1465-53.

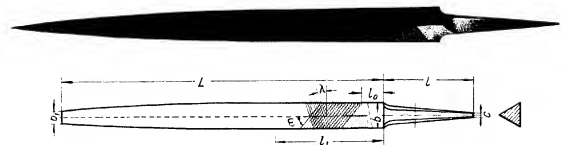
Designation of a square file, 150 mm working length, No. 6 cut:

Square file 150 No. 6 GOST 1465-53.



НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 1
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	9	4,5	40	15	50	1,5	20	55	13
125	11	5,5	50	15	63	2	20	55	11
150	13	6,5	50	15	75	2,5	20	55	11
200	15	7,5	60	20	100	2,5	20	55	10
250	18	9	70	20	125	2,5	20	55	9
300	21	10,5	80	20	150	3	20	55	8
350	24	12	90	25	175	3	20	55	7
400	27	13,5	100	25	200	3,5	20	55	6
450	30	15	100	30	225	3,5	20	55	5

Обозначение трехгранного напильника с длиной рабочей части 150 мм,
с насечкой № 1:

Напильн. трехгр. 150 № 1 ГОСТ 1465-53.

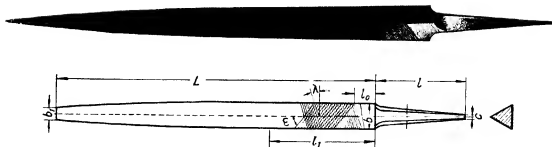
Designation of a three-square file, 150 mm working length, No. 1 cut:

Three-square file 150 No. 1 GOST 1465-53.



**НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 2**
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	9	4,5	40	15	50	1,5	20	55	25
125	11	5,5	50	15	63	2	20	55	22
150	13	6,5	50	15	75	2	20	55	22
200	15	7,5	60	20	100	2,5	20	55	20
250	18	9	70	20	125	2,5	20	55	18
300	21	10,5	80	20	150	3	20	55	16
350	24	12	90	25	175	3	20	55	14
400	27	13,5	100	25	200	3,5	20	55	13

Обозначение трехгранного напильника с длиной рабочей части 150 мм,
с насечкой № 2:

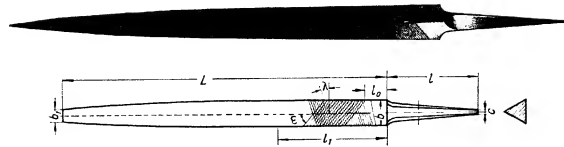
Напильн. трехгр. 150 № 2 ГОСТ 1465-53.

Designation of a three-square file, 150 mm working length, No. 2 cut:
Three-square file 150 No. 2 GOST 1465-53.



**НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 3**
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	7	2	40	15	33	1,5	20	55	40
150	9	3	50	15	50	2	20	55	36
200	11	4	60	20	67	2,5	20	55	32
250	15	5	70	20	83	2,5	20	55	28
300	18	6	80	20	100	3	20	55	25

Обозначение трехгранного напильника с длиной рабочей части 150 мм,
с насечкой № 3:

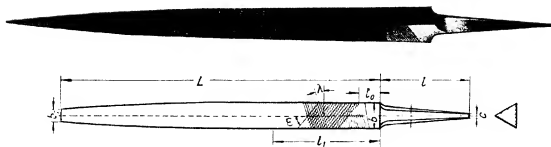
Напильн. трехгр. 150 № 3 ГОСТ 1465-53.

Designation of a three-square file, 150 mm working length, No. 3 cut:
Three-square file 150 No. 3 GOST 1465-53.



**НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 4**
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b_1	l	l_0	l_1	c			
100	7	2	40	15	33	1,5	20	55	56
150	9	3	50	15	50	2	20	55	50
200	11	4	60	20	67	2,5	20	55	45
250	15	5	70	20	83	2,5	20	55	40

Обозначение трехгранного напильника с длиной рабочей части 150 мм,
с насечкой № 4:

Напильн. трехгр. 150 № 4 ГОСТ 1465-53.

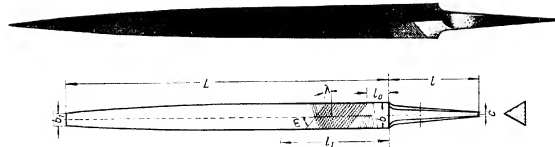
Designation of a three-square file, 150 mm working length, No. 4 cut:

Three-square file 150 No. 4 GOST 1465-53.



**НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 5**
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 5 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b_1	l	l_0	l_1	c			
100	7	2	40	15	33	1,5	20	55	71
150	9	3	50	15	50	2	20	55	63
200	11	4	60	20	67	2,5	20	55	56

Обозначение трехгранного напильника с длиной рабочей части 150 мм,
с насечкой № 5:

Напильн. трехгр. 150 № 5 ГОСТ 1465-53.

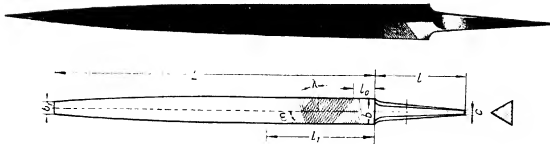
Designation of a three-square file, 150 mm working length, No. 5 cut:

Three-square file 150 No. 5 GOST 1465-53.



НАПИЛЬНИКИ ТРЕХГРАННЫЕ
с насечкой № 6
(по ГОСТ 1465-53)

THREE-SQUARE FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	7	2	40	15	33	1,5	20	55	80
150	9	3	50	15	50	2	20	55	71

Обозначение трехгранного напильника с длиной рабочей части 150 мм, с насечкой № 6:

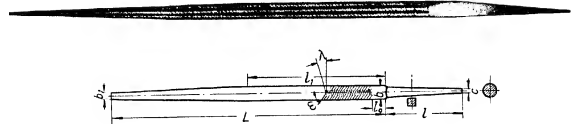
Напильн. трехгр. 150 № 6 ГОСТ 1465-53.

Designation of a three-square file, 150 mm working length, No. 6 cut:
Three-square file 150 No. 6 GOST 1465-53.



НАПИЛЬНИКИ КРУГЛЫЕ
с насечкой № 1
(по ГОСТ 1465-53)

ROUND FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	2	40	10	50	1,5	20	55	13
125	5	2,5	50	10	63	2	20	55	11
150	6	3	50	10	75	2	20	55	11
200	8	4	60	10	100	2,5	20	55	10
250	11	5,5	70	15	125	2,5	20	55	9
300	13	6,5	80	15	150	3	20	55	8
350	16	8	90	15	175	3	20	55	7
400	19	9,5	100	15	200	3,5	20	55	6
450	22	11	100	15	225	3,5	20	55	5

Обозначение круглого напильника с длиной рабочей части 150 мм, с насечкой № 1:

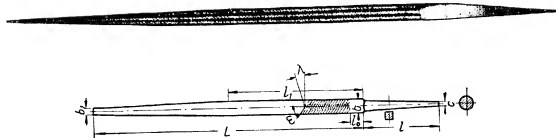
Напильн. кругл. 150 № 1 ГОСТ 1465-53.

Designation of a round file, 150 mm working length, No. 1 cut:
Round file 150 No. 1 GOST 1465-53.



НАПІЛЬНИКИ КРУГЛІЕ
с насечкой № 2
(по ГОСТ 1465-53)

ROUND FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	2	40	10	50	1,5	20	55	25
125	5	2,5	50	10	63	2	20	55	22
150	6	3	50	10	75	2	20	55	22
200	8	4	60	10	100	2,5	20	55	20
250	11	5,5	70	15	125	2,5	20	55	18
300	13	6,5	80	15	150	3	20	55	16
350	16	8	90	15	175	3	20	55	14
400	19	9,5	100	15	200	3,5	20	55	13

Обозначение круглого напильника с длиной рабочей части 150 мм, с насечкой № 2:

Напильн. кругл. 150 № 2 ГОСТ 1465-53.

Designation of a round file, 150 mm working length, No. 2 cut:

Round file 150 No. 2 GOST 1465-53.



НАПІЛЬНИКИ КРУГЛІЕ
с насечкой № 3
(по ГОСТ 1465-53)

ROUND FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	10	33	1,5	20	55	40
150	5	1,5	50	10	50	2	20	55	36
200	6	2	60	10	67	2,5	20	55	32
250	8	3	70	15	83	2,5	20	55	28
300	11	4	80	15	100	3	20	55	25

Обозначение круглого напильника с длиной рабочей части 150 мм, с насечкой № 3:

Напильн. кругл. 150 № 3 ГОСТ 1465-53.

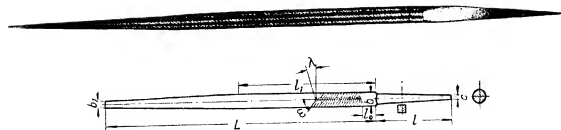
Designation of a round file, 150 mm working length, No. 3 cut:

Round file 150 No. 3 GOST 1465-53.



**НАПИЛЬНИКИ КРУГЛЫЕ
с насечкой № 4
(по ГОСТ 1465-53)**

**ROUND FILES, No. 4 CUT
(acc. to GOST 1465-53)**



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	10	33	1,5	20	55	56
150	5	1,5	50	10	50	2	20	55	50
200	6	2	60	10	67	2,5	20	55	45
250	8	3	70	15	83	2,5	20	55	40

Обозначение круглого напильника с длиной рабочей части 150 мм,
с насечкой № 4:

Напильн. кругл. 150 № 4 ГОСТ 1465-53.

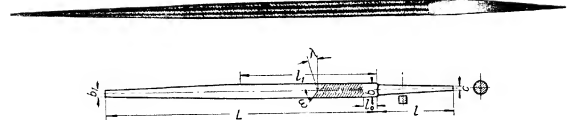
Designation of a round file, 150 mm working length, No. 4 cut:

Round file 150 No. 4 GOST 1465-53.



**НАПИЛЬНИКИ КРУГЛЫЕ
с насечкой № 5
(по ГОСТ 1465-53)**

**ROUND FILES, No. 5 CUT
(acc. to GOST 1465-53)**



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	10	33	1,5	20	55	71
150	5	1,5	50	10	50	2	20	55	63
200	6	2	60	10	67	2,5	20	55	56

Обозначение круглого напильника с длиной рабочей части 150 мм,
с насечкой № 5:

Напильн. кругл. 150 № 5 ГОСТ 1465-53.

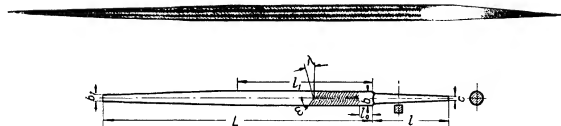
Designation of a round file, 150 mm working length, No. 5 cut:

Round file 150 No. 5 GOST 1465-53.



**НАПИЛЬНИКИ КРУГЛЫЕ
с насечкой № 6**
(по ГОСТ 1465-53)

ROUND FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm							λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	l	l ₀	l ₁	c			
100	4	1	40	10	33	1,5	20	55	80
150	5	1,5	50	10	50	2	20	55	71

Обозначение круглого напильника с длиной рабочей части 150 мм, с насечкой № 6:

Напильн. кругл. 150 № 6 ГОСТ 1465-53.

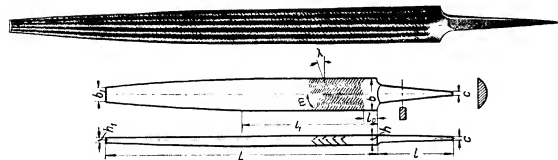
Designation of a round file, 150 mm working length, No. 6 cut:

Round file 150 No. 6 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 1**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 1 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Вид напильника Type of file	Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
	L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
A	100	12	6	4	2,0	40	10	50	1,5	20	55	13
A	125	15	7,5	5	2,5	50	10	63	2	20	55	11
A	150	18	9	6	3	60	10	75	2	20	55	11
A	200	22	11	7	3,5	80	10	100	2,5	20	55	10
A	250	26	13	9	5	100	15	125	2,5	20	55	9
A	300	30	15	10	5,5	120	15	150	3	20	55	8
A	350	35	17,5	11	6	140	15	175	3	20	55	7
A	400	40	20	12	6,5	160	15	200	3,5	20	55	6
A	450	45	22,5	13	7	180	15	225	3,5	20	55	5
B	100	12	8	4	2	40	10	50	1,5	20	55	13
B	150	18	11,5	6	3	60	10	75	2	20	55	11
B	200	22	14	7	3,5	80	10	100	2,5	20	55	10
B	250	26	16	9	5	100	15	125	2,5	20	55	9
B	300	30	20	10	5,5	120	15	150	3	20	55	8
B	350	35	23	11	6	140	15	175	3	20	55	7
B	400	40	27	12	6,5	160	15	200	3,5	20	55	6

1. Напильники вида Б изготавливают только по специальному заказу.
2. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядками, или двойная без рядков.
3. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 1:

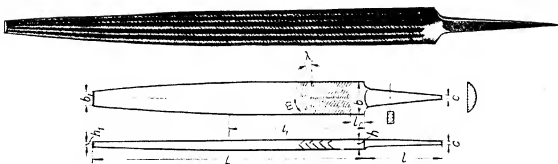
Напильн. полукругл. 150 № 1 ГОСТ 1465-53.

1. Type B files are furnished on special order only.
2. The flat side of files is double cut. The convex side is cut with teeth in rows, or double cut without rows.
3. Designation of a half-round file, 150 mm working length, No. 1 cut:
Half-round file 150 No. 1 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 2**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Вид напильника Type of file	Размеры в мм Dimensions in mm									α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
	L	b	b ₁	h	h ₁	l	l ₁	c				
A	100	12	6	4	2,0	40	10	50	1,5	20	55	25
A	125	15	7,5	5	2,5	50	10	63	2	20	55	22
A	150	18	9	6	3	50	10	75	2	20	55	22
A	200	22	11	7	3,5	60	10	100	2,5	20	55	20
A	250	26	13	9	5	70	15	125	2,5	20	55	18
A	300	30	15	10	5,5	80	15	150	3	20	55	16
A	350	35	17,5	11	6	90	15	175	3	20	55	14
A	400	40	20	12	6,5	100	15	200	3,5	20	55	13
B	100	12	8	4	2	40	10	50	1,5	20	55	25
B	150	18	11,5	6	3	50	10	75	2	20	55	22
B	200	22	14	7	3,5	60	10	100	2,5	20	55	20
B	250	26	16	9	5	70	15	125	2,5	20	55	18
B	300	30	20	10	5,5	80	15	150	3	20	55	16
B	350	35	23	11	6	90	15	175	3	20	55	14
B	400	40	27	12	6,5	100	15	200	3,5	20	55	13

1. Напильники вида Б изготавливают только по специальному заказу.
2. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядками, или двойная без рядков.
3. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 2:

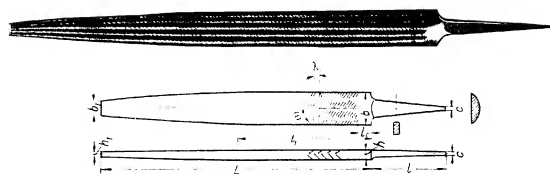
Напильн. полукругл. 150 № 2 ГОСТ 1465-53.

1. Type B files are furnished on special order only.
2. The flat side of files is double cut. The convex side is cut with teeth in rows, or double cut without rows.
3. Designation of a half-round file, 150 mm working length, No. 2 cut:
Half-round file 150 No. 2 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 3**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b_1	h	h_1	l	l_0	l_1	c			
100	12	4	4	1,5	40	10	33	1,5	20	55	40
150	15	5	5	2,5	50	10	50	2	20	55	36
200	18	6	6	3	60	10	67	2,5	20	55	32
250	22	7	7	3,5	70	15	83	2,5	20	55	28
300	26	9	9	4,5	80	15	100	3	20	55	25

1. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядками, или двойная без рядков.
2. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 3:

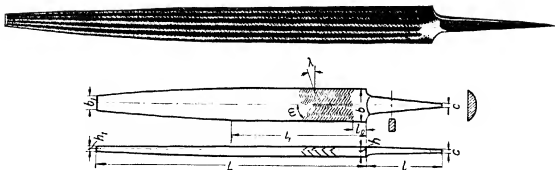
Напильн. полукругл. 150 № 3 ГОСТ 1465-53.

1. The flat side of files is double cut. The convex side is cut with teeth in rows, or double cut without rows.
2. Designation of a half-round file, 150 mm working length, No. 3 cut:
Half-round file 150 No. 3 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 4**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm									z ⁰	ω ⁰	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	12	4	4	1,5	40	10	33	1,5	20	55	56
150	15	5	5	2,5	50	10	50	2	20	55	50
200	18	6	6	3	60	10	67	2,5	20	55	45
250	22	7	7	3,5	70	15	83	2,5	20	55	40

1. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядами, или двойная без рядов.

2. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 4:

Напильн. полукругл. 150 № 4 ГОСТ 1465-53.

1. The flat side of files is double cut.

The convex side is cut with teeth in rows, or double cut without rows.

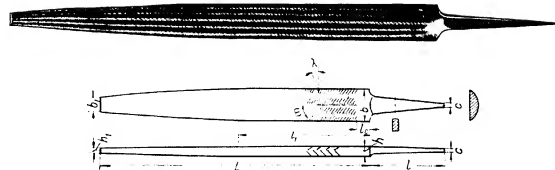
2. Designation of a half-round file, 150 mm working length, No. 4 cut:

Half-round file 150 No. 4 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 5**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 5 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm									z ⁰	ω ⁰	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	12	4	4	1,5	40	10	33	1,5	20	55	71
150	15	5	5	2,5	50	10	50	2	20	55	63
200	18	6	6	3	60	10	67	2,5	20	55	56

1. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядами, или двойная без рядов.

2. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 5:

Напильн. полукругл. 150 № 5 ГОСТ 1465-53.

1. The flat side of files is double cut.

The convex side is cut with teeth in rows, or double cut without rows.

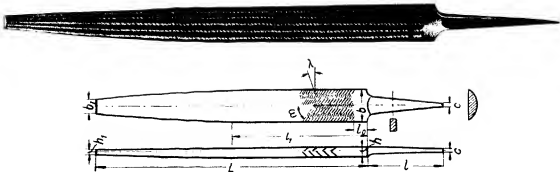
2. Designation of a half-round file, 150 mm working length, No. 5 cut:

Half-round file 150 No. 5 GOST 1465-53.



**НАПИЛЬНИКИ ПОЛУКРУГЛЫЕ
с насечкой № 6**
(по ГОСТ 1465-53)

HALF-ROUND FILES, No. 6 CUT
(acc. to GOST 1465-53)



Материал: углеродистый сталь.
Material: carbon steel

Размеры в мм Dimensions in mm									α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	b ₁	h	h ₁	l	l ₀	l ₁	c			
100	12	4	4	1,5	40	10	33	1,5	20	55	80
150	15	5	5	2,5	50	10	50	2	20	55	71

1. Насечка плоской стороны двойная. Насечка выпуклой стороны может быть рядками, или двойная без рядков.

2. Обозначение полукруглого напильника с длиной рабочей части 150 мм, с насечкой № 6:

Напильн. полукругл. 150 № 6 ГОСТ 1465-53.

1. The flat side of files is double cut.

The convex side is cut with teeth in rows, or double cut without rows.

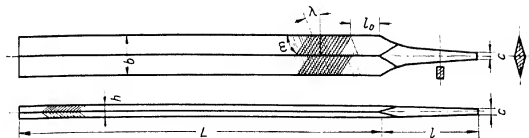
2. Designation of a half-round file, 150 mm working length, No. 6 cut:

Half-round file 150 No. 6 GOST 1465-53.



**НАПИЛЬНИКИ РОМБИЧЕСКИЕ
с насечкой № 2**
(по ГОСТ 1465-53)

LOZENGE FILES, No. 2 CUT
(acc. to GOST 1465-53)



Материал: углеродистый сталь.
Material: carbon steel

Размеры в мм Dimensions in mm						α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	l	l ₀	c			
100	12	3,5	40	15	1,5	20	55	25
150	18	5	50	15	2	20	55	22
200	22	6	60	20	2,5	20	55	20
250	26	7	70	20	2,5	20	55	18

Обозначение ромбического напильника с длиной рабочей части 150 мм, с насечкой № 2:

Напильн. ромб. 150 № 2 ГОСТ 1465-53.

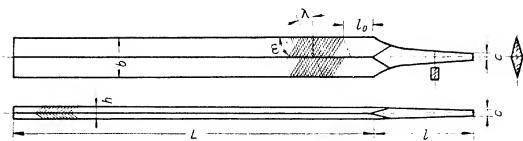
Designation of a lozenge file, 150 mm working length, No. 2 cut:

Lozenge file 150 No. 2 GOST 1465-53.



НАПИЛЬНИКИ РОМБИЧЕСКИЕ
с насечкой № 3
(по ГОСТ 1465-53)

LOZENGE FILES, No. 3 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm						α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	l	l ₀	c			
100	12	3,5	40	15	1,5	20	55	40
150	18	5	50	15	2	20	55	36
200	22	6	60	20	2,5	20	55	32
250	26	7	70	20	2,5	20	55	28

Обозначение ромбического напильника с длиной рабочей части 150 мм, с насечкой № 3:

Напильн. ромб. 150 № 3 ГОСТ 1465-53.

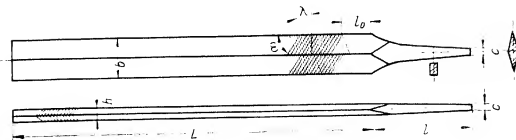
Designation of a lozenge file, 150 mm working length, No. 3 cut:

Lozenge file 150 No. 3 GOST 1465-53.



НАПИЛЬНИКИ РОМБИЧЕСКИЕ
с насечкой № 4
(по ГОСТ 1465-53)

LOZENGE FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm						α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	l	l ₀	c			
100	12	3,5	40	15	1,5	20	55	56
150	18	5	50	15	2	20	55	50
200	22	6	60	20	2,5	20	55	45

Обозначение ромбического напильника с длиной рабочей части 150 мм, с насечкой № 4:

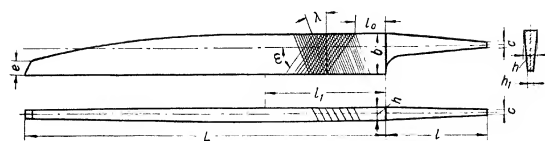
Напильн. ромб. 150 № 4 ГОСТ 1465-53.

Designation of a lozenge file, 150 mm working length, No. 4 cut:

Lozenge file 150 No. 4 GOST 1465-53.



**НАПИЛЬНИКИ НОЖОВЧНЫЕ
с насечкой № 2
(по ГОСТ 1465-53)
KNIFE FILES, No. 2 CUT
(acc. to GOST 1465-53)**



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	e	c			
100	12	3,5	1	40	15	50	4	1,5	20	55	25
150	18	5	1,2	50	15	75	5	2	20	55	22
200	22	6	1,4	60	20	100	6	2,5	20	55	20
250	26	7	1,6	70	20	125	7	2,5	20	55	18
300	30	8	1,8	80	20	150	8	3	20	55	16

1. Указан сторона напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон.
2. Обозначение ножовочного напильника с длиной рабочей части 150 мм, с насечкой № 2:

Напильн. ножов. 150 № 2 ГОСТ 1465-53.

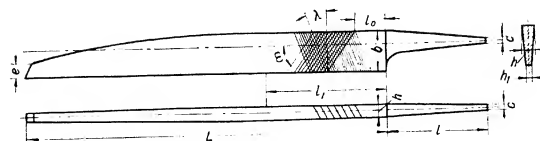
1. Files have a single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides.

2. Designation of a knife file, 150 mm working length, No. 2 cut:

Knife file 150 No. 2 GOST 1465-53.



**НАПИЛЬНИКИ НОЖОВЧНЫЕ
с насечкой № 3
(по ГОСТ 1465-53)
KNIFE FILES, No. 3 CUT
(acc. to GOST 1465-53)**



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									α°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	e	c			
100	12	3,5	1	40	15	50	4	1,5	20	55	40
150	18	5	1,2	50	15	75	5	2	20	55	36
200	22	6	1,4	60	20	100	6	2,5	20	55	32
250	26	7	1,6	70	20	125	7	2,5	20	55	28
300	30	8	1,8	80	20	150	8	3	20	55	25

1. Указан сторона напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон.
2. Обозначение ножовочного напильника с длиной рабочей части 150 мм, с насечкой № 3:

Напильн. ножов. 150 № 3 ГОСТ 1465-53.

1. Files have a single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides.

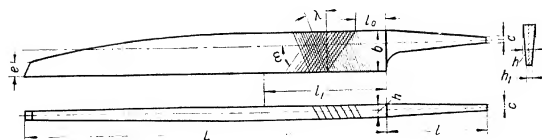
2. Designation of a knife file, 150 mm working length, No. 3 cut:

Knife file 150 No. 3 GOST 1465-53.



НАПИЛЬНИКИ НОЖОВЧНЫЕ
с насечкой № 4
(по ГОСТ 1465-53)

KNIFE FILES, No. 4 CUT
(acc. to GOST 1465-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm									λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length
L	b	h	h ₁	l	l ₀	l ₁	e	c			
100	12	3,5	1	40	15	33	4	1,5	20	55	56
150	18	5	1,2	50	15	50	5	2	20	55	50
200	22	6	1,4	60	20	67	6	2,5	20	55	45
250	26	7	1,6	70	20	83	7	2,5	20	55	40

1. Узкая сторона напильника имеет одинарную насечку. Число насечек равно числу основных насечек широких сторон.

2. Обозначение ножовочного напильника с длиной рабочей части 150 мм, с насечкой № 4:

Напильн. ножов. 150 № 4 ГОСТ 1465-53.

1. Files have a single cut edge, the number of teeth being the same as the number of overcut teeth on the file sides.

2. Designation of a knife file, 150 mm working length, No. 4 cut:

Knife file 150 No. 4 GOST 1465-53.



НАДФИЛИ

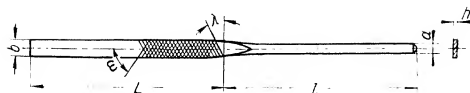
NEEDLE FILES

НАДФИЛИ ПЛОСКИЕ ТУПОНОСЫЕ

(по ГОСТ 1513-53)

EQUALING NEEDLE FILES

(acc. to GOST 1513-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
L	b	h	d	l			номер насечки cut No.					
60	4	1	2,5	60	20	55	—	—	40	50	63	80
80	5,5	1,5	3,5	80	20	55	25	32	40	—	—	—

1. Указе стороны надфиля имеют одинарную насечку. По специальному заказу указе стороны могут быть изготовлены с двойной насечкой.

2. Обозначение плоского тупоносого надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. плоск. тупон. 80 № 2 ГОСТ 1513-53.

1. Both file edges are single cut. On special order files may be furnished with double cut edges.

2. Designation of a equaling needle file, 80 mm working length, No. 2 cut:

Equaling needle file 80 No. 2 GOST 1513-53.

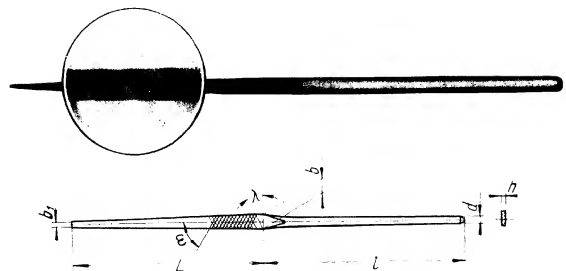


НАДФИЛИ ПЛОСКИЕ ОСТРОНОСЫЕ

(по ГОСТ 1513-53)

FLAT NEEDLE FILES

(acc. to GOST 1513-53)



Материал: углеродистая сталь

Material: carbon steel

Размеры в мм Dimensions in mm						λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
L	b	b ₁	h	d	l			номер насечки cut No.					
60	4	0,8	1	2,5	60	20	55	—	—	40	50	63	80
80	5,5	1,3	1,5	3,5	80	20	55	25	32	40	—	—	—

1. Указе стороны надфиля имеют одинарную насечку.

2. Обозначение плоского остроносого надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. плоск. острон. 80 № 2 ГОСТ 1513-53.

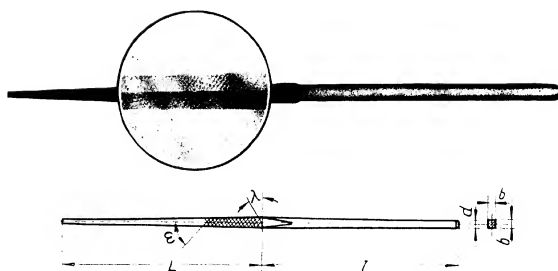
1. Both file edges are single cut.

2. Designation of a flat needle file, 80 mm working length, No. 2 cut:

Flat needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ КВАДРАТНЫЕ
(по ГОСТ 1513-53)
SQUARE NEEDLE FILES
(acc. to GOST 1513-53)



Материал: углеродистая сталь.
Material: carbon steel

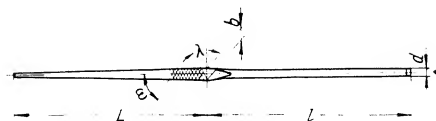
Размеры в мм Dimensions in mm				λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10mm of length					
						номер насечки cut No.					
L	b	d	l			1	2	3	4	5	6
60	2	2,5	60	20	55	—	—	40	50	63	80
80	3	3,5	80	20	55	25	32	40	—	—	—

Обозначение квадратного надфиля с длиной рабочей части 80 мм,
с насечкой № 2: Надф. квадр. 80 № 2 ГОСТ 1513-53.

Designation of a square needle file, 80 mm working length, No. 2 cut:
Square needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ ТРЕХГРАННЫЕ
(по ГОСТ 1513-53)
THREE-SQUARE NEEDLE FILES
(acc. to GOST 1513-53)



Материал: углеродистая сталь.
Material: carbon steel

Размеры в мм Dimensions in mm				λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
						номер насечки cut No.					
L	b	d	l			1	2	3	4	5	6
60	2,8	2,5	60	20	55	—	—	40	50	63	80
80	4	3,5	80	20	55	25	32	40	—	—	—

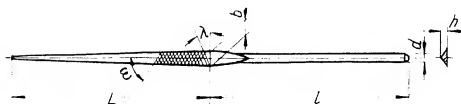
Обозначение трехгранного надфиля с длиной рабочей части 80 мм,
с насечкой № 2: Надф. трехгран. 80 № 2 ГОСТ 1513-53.

Designation of a three-square needle file, 80 mm working length, No. 2 cut:
Three-square needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ ТРЕХГРАННЫЕ ОДНОСТОРОННИЕ (по ГОСТ 1513-53)

BARRETTE NEEDLE FILES (acc. to GOST 1513-53)



Материал: углеродистая сталь.

Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
L	b	h	d	l			номер насечки cut No.					
40	3	1	2	80	20	55	—	—	—	50	63	80
60	4	1,4	2,5	60	20	55	—	—	40	50	63	80
80	5,5	2	3,5	80	20	55	25	32	40	—	—	—

Обозначение трехгранного одностороннего надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. трехгр. одностор. 80 № 2 ГОСТ 1513-53.

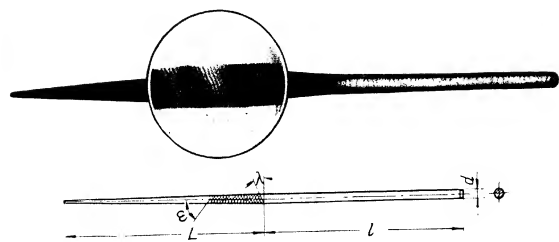
Designation of a barrette needle file, 80 mm working length, No. 2 cut:

Barrette needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ КРУГЛЫЕ (по ГОСТ 1513-53)

ROUND NEEDLE FILES (acc. to GOST 1513-53)



Материал: углеродистая сталь.

Material: carbon steel

Размеры в мм Dimensions in mm			λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
L	d	l			номер насечки cut No.					
60	2,5	60	20	55	—	—	40	50	63	80
80	3,5	80	20	55	25	32	40	—	—	—

Обозначение круглого надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. круг. 80 № 2 ГОСТ 1513-53.

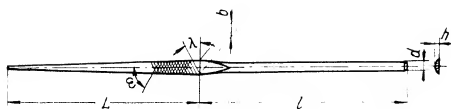
Designation of a round needle file, 80 mm working length, No. 2 cut:

Round needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ ПОЛУКРУГЛЫЕ (по ГОСТ 1513-53)

HALF-ROUND NEEDLE FILES (acc. to GOST 1513-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
							номер насечки cut No.					
L	b	h	d	l			1	2	3	4	5	6
60	4	1,5	2,5	60	20	55	—	—	40	50	63	80
80	5	2	3,5	80	20	55	25	32	40	—	—	—

Обозначение полукруглого надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. полукр. 80 № 2 ГОСТ 1513-53.

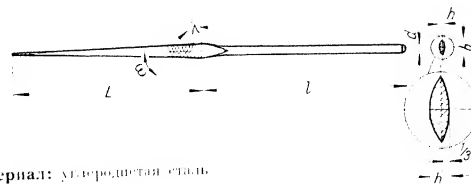
Designation of a half-round needle file, 80 mm working length, No. 2 cut:

Half-round needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ ОВАЛЬНЫЕ (по ГОСТ 1513-53)

CROSSING NEEDLE FILES (acc. to GOST 1513-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
							номер насечки cut No.					
L	b	h	d	l			1	2	3	4	5	6
40	3	1	2	80	20	55	—	—	—	50	63	80
60	4	1,5	2,5	60	20	55	—	—	40	50	63	80
80	5	2	3,5	80	20	55	25	32	40	—	—	—

Обозначение овального надфиля с длиной рабочей части 80 мм, с насечкой № 2:

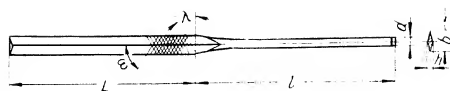
Надф. ов. 80 № 2 ГОСТ 1513-53.

Designation of a crossing needle file, 80 mm working length, No. 2 cut:

Crossing needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ РОМБИЧЕСКИЕ
(по ГОСТ 1513-53)
LOZENGE NEEDLE FILES
(acc. to GOST 1513-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
L	b	h	d	l			номер насечки cut No.					
60	3,5	1,4	2,5	60	20	55	—	—	40	50	63	80
80	5	2	3,5	80	20	55	25	32	40	—	—	—

Обозначение ромбического надфиля с длиной рабочей части 80 мм, с насечкой № 2:

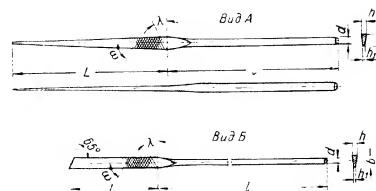
Надф. ромб. 80 № 2 ГОСТ 1513-53.

Designation of a lozenge needle file, 80 mm working length, No. 2 cut:

Lozenge needle file 80, No. 2 GOST 1513-53.



НАДФИЛИ НОЖОВЫЕ
(по ГОСТ 1513-53)
KNIFE NEEDLE FILES
(acc. to GOST 1513-53)



Материал: углеродистая сталь
Material: carbon steel

Вид над- филя Type of file	Размеры в мм Dimensions in mm						λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length					
	L	h	h ₁	b	d	l			номер насечки cut No.					
A	60	1,4	0,3	4,5	2,5	60	20	55	—	—	40	50	63	80
A	80	2	0,5	5,5	3,5	80	20	55	25	32	40	—	—	—
B	40	1	0,1	4,0	2,0	80	20	55	—	—	—	50	63	80

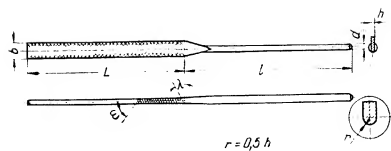
1. Боковые и верхняя узкая сторона надфилей имеют двойную насечку, а узкая нижняя сторона надфилей вида А — единичную насечку.
2. Ширина и толщина надфилей вида А уменьшаются по направлению к концу.
3. Толщина надфилей вида В по длине не изменяется.
4. Обозначение ножовочного надфиля с длиной рабочей части 80 мм, с насечкой № 2:

Надф. нож. 80 № 2 ГОСТ 1513-53.

1. Both sides and upper edge of files are double cut; the lower edge of type A files is single cut.
2. Type A files are tapered in width and thickness to the point of file.
3. Type B files are parallel in thickness the entire length.
4. Designation of a knife needle file, 80 mm working length, No. 2 cut:
Knife needle file 80 No. 2 GOST 1513-53.



НАДФИЛИ ПАЗОВЫЕ
(по ГОСТ 1513-53)
CROCHET NEEDLE FILES
(acc. to GOST 1513-53)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm					λ°	ω°	Число основных насечек на 10 мм длины Number of overcut teeth per 10 mm of length	
L	b	h	d	l			номер насечки cut No.	
60	4	1	2,5	60	20	55	25	32
80	5,5	1,5	3,5	80	20	55	25	32

1. По специальному заказу пазовые надфили могут быть изготовлены и других размеров.
2. Овальные стороны надфилей имеют двойную насечку. По специальному заказу надфили могут быть изготовлены с одинарной насечкой.
3. Обозначение пазового надфиля толщиной 1 мм, с насечкой № 2:
Надф. паз. 1 мм № 2 ГОСТ 1513-53.

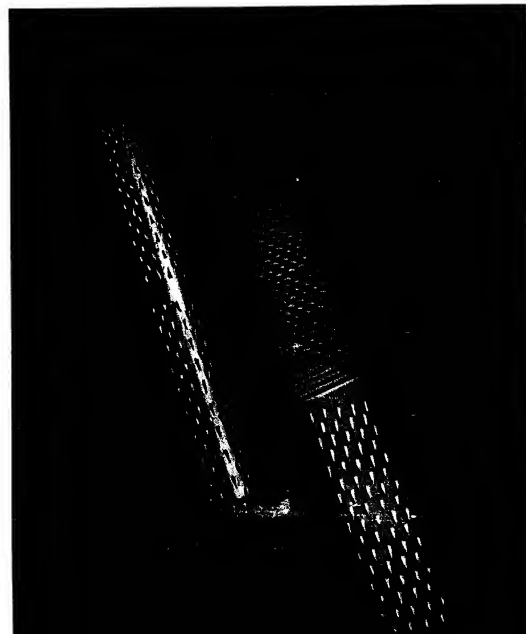
1. Files of other sizes may be furnished on special order.
2. Oval sides of files are double cut. Single cut files are special.
3. Designation of a crochet needle file, 1 mm thickness, No. 2 cut:
Crochet needle file 1 mm No. 2 GOST 1513-53.

60

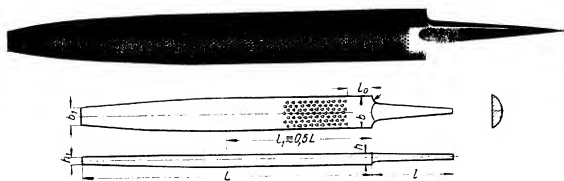


РАШПИЛИ

RASPS



РАШПИЛИ ПОЛУКРУГЛЫЕ
(по ОСТ НКТМ 2008-39)
HALF-ROUND RASPS
(acc. to OST NKTM 2008-39)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm						Класс на- сечки Cut No.	Число насечек на 10 мм Number of teeth per 10 mm	
L	l ₀	b	b ₁	h	h ₁		по длине рашпиля of rasp length	по ширине рашпиля of rasp width
250	15	26	13	9	4,8	1	3,6	2,8
250	15	26	13	9	4,8	2	6,0	4
350	15	35	17,5	11	6	1	2,8	2,0
350	15	35	17,5	11	6	2	5,2	3,2

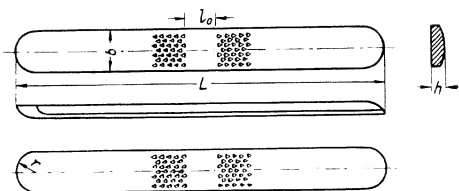
Обозначение рашпиля полукруглого с длиной рабочей части 250 мм, с насечкой № 2:

Рашпиль полукруглый 250 № 2 ОСТ НКТМ 2008-39.

Designation of a half-round rasp, 250 mm working length, No. 2 cut:
Half-round rasp 250 No. 2 OST NKTM 2008-39.



РАШПИЛИ САПОЖНЫЕ
(по ОСТ НКТМ 2010-39)
SHOE RASPS
(acc. to OST NKTM 2010-39)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm				Класс насечки Cut No.	Число насечек на 10 мм Number of teeth per 10 mm	
L	l ₀	b	h		по длине рашпиля of rasp length	по ширине рашпиля of rasp width
200	20	22	6	2	6,4	4,4
250	20	26	8	2	6	4

Обозначение рашпиля сапожного длиной 200 мм, с насечкой № 2:

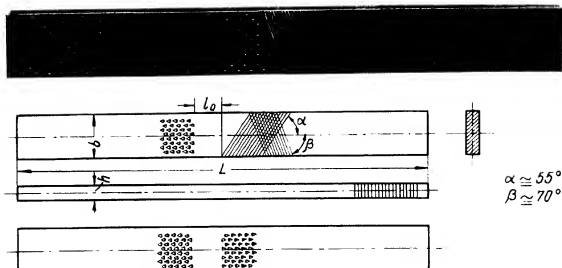
Рашпиль сапожный 200 № 2 ОСТ НКТМ 2010-39.

Designation of a shoe rasp, 200 mm length, No. 2 cut:

Shoe rasp 200 No. 2 OST NKTM 2010-39.



РАШПИЛИ КОННЫЕ
(по OST NKTМ 2011-39)
HORSE RASPS
(acc. to OST NKTМ 2011-39)



Материал: углеродистая сталь
Material: carbon steel

Размеры в мм Dimensions in mm				Класс насеки Cut No.	Число рашпильных насежек на 10 мм Number of teeth per 10mm	
L	l_0	b	h		по длине рашпиля of rasp length	по ширине рашпиля of rasp width
350	25	40	7	1	2,8	2,0
400	25	45	8	1	2,4	1,6

Обозначение рашпиля конного длиной 400 мм, с насечкой № 1:
Рашпиль конный 400 № 1 OST NKTМ 2011-39.

Designation of a horse rasp, 400 mm length, No. 1 cut:
Horse rasp 400 No. 1 OST NKTМ 2011-39.



ВСЕСОЮЗНОЕ ЭКСПОРТНО-ИМПОРТНОЕ ОБЪЕДИНЕНИЕ
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Режущий инструмент по металлу и дереву
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«Станкоимпорт»

Телеграфный адрес:
Москва Станкоимпорт

Конструкции и технические характеристики инструмента, приведенного
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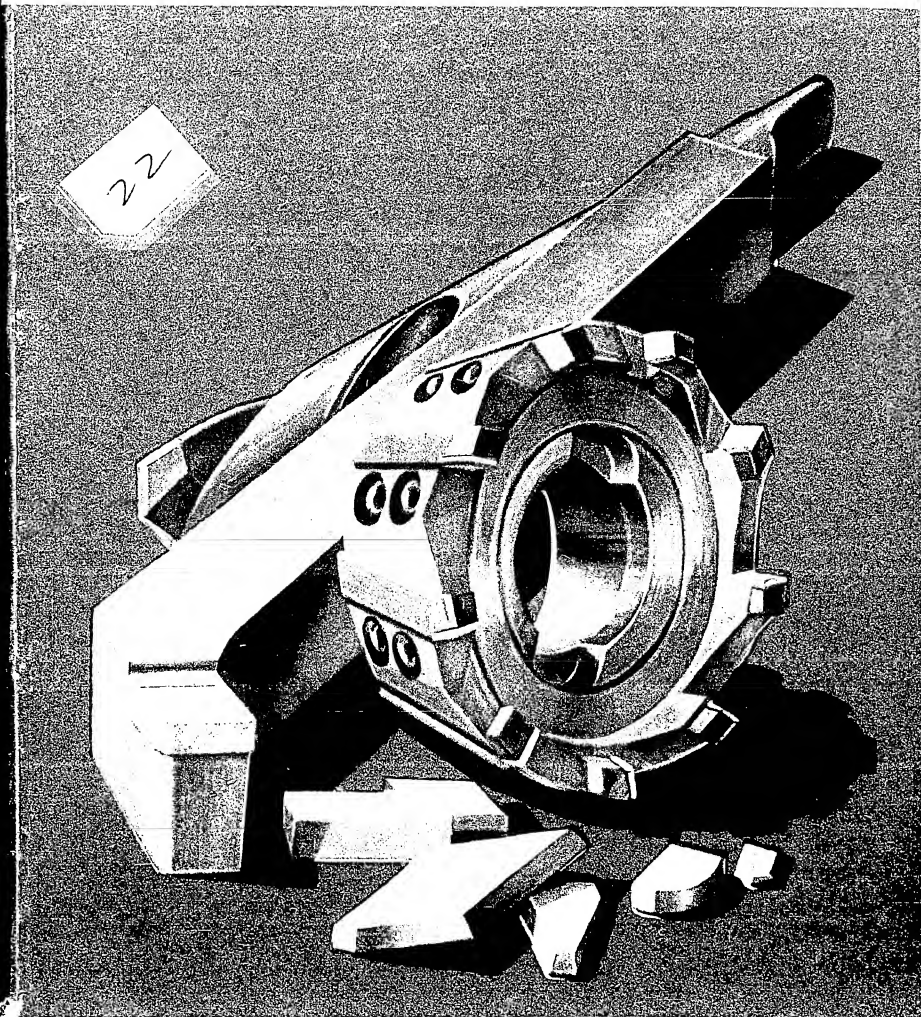
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Design and specifications of the tools illustrated herein are subject to change without notice.

for metal cutting



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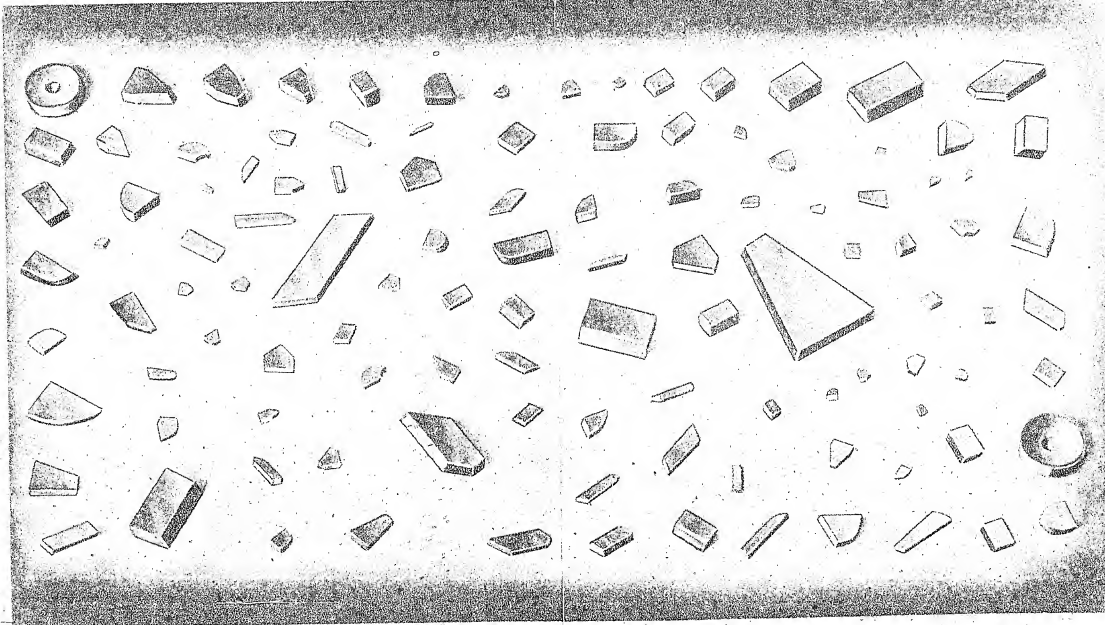


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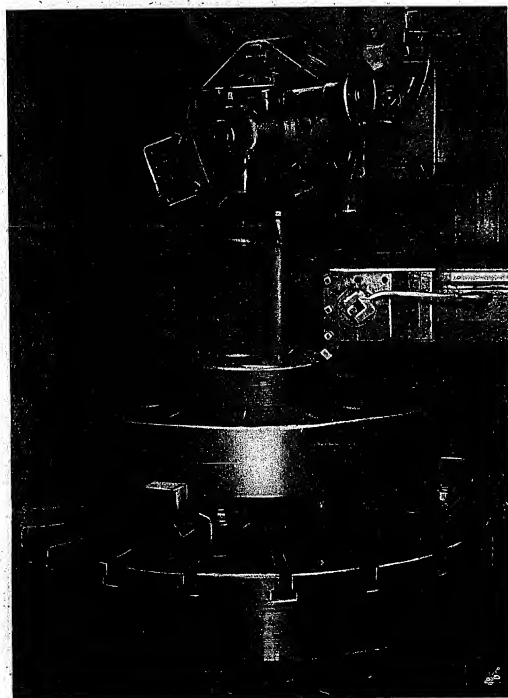
SINTERED CARBIDES

for metal cutting

CATALOGUE AND INSTRUCTIONS
№ 12



UNION TRUST OF HARD ALLOY INDUSTRY
USSR • MOSCOW



Machining of fly-wheel with carbide tipped tools

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ATTENTION OF CARBIDE CONSUMERS

The application of hard alloys for
metal drawing is described in our
catalogue

No. 10

"CARBIDES FOR WIRE DRAWING AND
FOR CALIBRATION OF METAL RODS"

The application of hard alloys for
mining Industry is described in our
catalogue

No. 11

"HARD ALLOYS FOR THE MINING
INDUSTRY"

WHAT IS SINTERED CARBIDE?

Sintered Carbides consist of the finest grains of carbides (carbon compositions) of rare refractory metals—tungsten and titanium, cemented by a binding metal—cobalt.

Owing to a special method of manufacture—which consists in pressing the powders and sintering them without bringing the entire compound to the melting point—our alloys maintain the extremely valuable properties of the initial carbides, the hardness of which is almost identical to that of the diamond, combined with toughness resulting from the presence of cobalt.

PROGRESS OF INDUSTRY CALLS FOR THE USE OF CARBIDES.

Highly efficient and economical production is impossible without the use of Sintered Carbides.

This is mainly due to the fact that Sintered Carbides are far more efficient than other cutting materials: *they greatly increase the productive capacity of the equipment available and reduce the cost of manufacture.* Owing to their great hardness and high wear-resistance Sintered Carbides can be used for machining of almost all kinds of metals and non-metallic materials.

Due to these properties both a perfect surface finish and a high accuracy of the machined part are obtained, as *Carbides can be used for a long period of time without showing any substantial wear.*

Sintered Carbides do not lose their cutting ability even at high temperatures. This permits to use the Sintered Carbide with very high cutting speeds and large chip cross-sections.

High wear-resistance of the Sintered Carbides makes them an indispensable material for the production of various special tools, shaped cutters and auxiliary tools, as well as for the manufacture of machine parts subject to rapid wear.

Speedy methods of metal cutting are unobtainable without the most extensive application of high quality Sintered Carbides.

The use of Sintered Carbides makes it possible to machine such materials as hardened steel, chilled cast iron, granite, etc.

Sintered Carbides are successfully used for wheel dressing and for machining and cutting of glass; in many cases they are applied in place of diamonds.

All these advantages enable every industrial works to obtain a considerable economy and to reduce the cost of production.

HOW TO SELECT THE PROPER GRADE OF CARBIDE

Sintered Carbides produced by our industry are divided into two groups: Group "TK" tungsten-titanium alloys intended for steel cutting, and group "BK" tungsten-carbide and cobalt, intended for cutting of cast iron, non-ferrous metals and their alloys and non-metallic materials.

Each group is subdivided into several grades having peculiar properties, which determine the field of its application. The properties of various Carbide grades produced are combined in such a way as to meet practically any requirements which may arise in a modern industrial works.

The proper selection of Carbide Grades for any particular purpose is a very important factor which influences the effective application of the Sintered Carbides.

CHEMICAL COMPOSITION OF SINTERED CARBIDES

Group of Carbides	Grade	Approximate chemical composition in %		
		Tungsten Carbide	Titanium Carbide	Cobalt
Tungsten-Cobalt "BK"	BK2	98	—	2
	BK3	97	—	3
	BK6	94	—	6
	BK8	92	—	8
	BK11	89	—	11
Tungsten-Titanium Cobalt "TK"	T5K10	85	6	9
	T14K8	78	14	8
	T15K6	79	15	6
	T15K6T	79	15	6
	T30K4	66	30	4
	T60K6	34	60	6

PHYSICAL AND MECHANICAL PROPERTIES OF SINTERED CARBIDES

Group of Carbides	Grade	Ultimate bending strength kg/mm ² (not less)	Specific Gravity	Rockwell hardness (not less)
Tungsten-Cobalt "BK"	BK2	100	15.0—15.4	90.0
	BK3	100	14.9—15.3	89.0
	BK6	120	14.6—15.0	88.0
	BK8	130	14.4—14.8	87.5
	BK11	150	14.0—14.4	86.0
Tungsten-Titanium Cobalt "TK"	T5K10	115	12.3—13.2	88.5
	T14K8	115	12.2—12.0	89.5
	T15K6	110	11.0—11.7	90.0
	T15K6T	110	11.0—11.7	91.0
	T30K4	90	9.5—9.8	92.0
	T60K6	75	6.5—7.0	90.0

COMPARATIVE UTILIZATION PROPERTIES OF SINTERED CARBIDES

Group "BK"		Group "TK"	
Grade	Utilization properties	Grade	Utilization properties
BK2	The hardest, most wear- and heat-resistant alloy of this group	T5K10	The highest utilization toughness for this group of carbides. Less hard and wear-resistant than grade T14K8.
BK3	High wear-resistance and hardness, but less than for grade BK2	T14K8	More hard, wear- and heat-resistant than grade T5K10 with somewhat less utilization toughness.
BK6	Less toughness and wear-resistance than grade BK3 with higher utilization toughness.	T15K6	More hard, wear- and heat-resistant than grade T14K8 with less utilization toughness.
BK8	High utilization toughness, high resistivity shocks and vibrations but less hard and wear-resistant than grade BK6.	T15K6T	More hard, wear- and heat-resistant than grade T15K6 with somewhat lower utilization toughness.

Group "BK"

Grade	Utilization properties
BK11	The most tough of above mentioned Tungsten-Carbide hard alloys. The lowest hardness and wear-resistance. Used when cutting materials difficult for machining.

Continuation
Group "TK"

Grade	Utilization properties
T30K6	Extremely wear- and heat-resistant with lowest utilization toughness.

The following principal points are to be considered when selecting the grade of Sintered Carbide:

1. Physical and mechanical properties of Sintered Carbides.
2. Characteristics of the material to be machined.
3. Kind and conditions of machining operation.
4. Required accuracy and surface finish of the surface to be machined.
5. Condition and kinematic and dynamical capacities of the machine tool.

The table given below contains suggestions how to select the proper grade of Sintered Carbide depending on type and conditions of operation and material to be machined.

In some cases, however, due to the specific features of the machining process, unusual conditions of application or special kind of material to be cut, this table may prove insufficient.

In such case the ALL-UNION BUREAU OF TECHNICAL AID IN THE FIELD OF CARBIDE APPLICATION should be applied to for advice.

GRADE SELECTION DEPENDING ON KIND AND CONDITIONS OF MACHINING
OPERATION AND MATERIAL TO BE MACHINED

Kind and terms of machining operation	Rigidity of the system "Machine-tool-part-tool"	Comparative grade productivity	Carbon and alloy steel	Sintered carbide Grades suggested for machining					
				Special steels	Hardened steel	Cast iron $H_b \leq 240$	Cast iron of high hardness $H_b = 400-700$	Non-ferrous metals and alloys	Non-metallic materials
TURNING OF EXTERNAL AND FACE SURFACES AND BORING									
Rough turning of forgings and castings of scale surfaces with varying depth of cut and interrupted cuts	High	Highest	T5K10	BK8	—	BK6	—	BK6	—
	Normal	Middle	BK8	BK11	—	BK6	—	BK6	—
	Insufficient	Reduced	BK11	—	—	BK8	—	BK8	—
Rough turning of scale surfaces with varying depth of cut and uninterrupted cuts	High	Highest	T15K6	T5K10	—	BK6	BK6	BK6	BK2 BK3
	Normal	Middle	T14K8	BK8	—	BK6	BK6	BK6	BK6
	Insufficient	Reduced	T5K10	BK11	—	BK8	BK8	BK8	BK8
Semi-finish and finish turning with interrupted cut	High	Highest	T15K6	T5K10	T14K8	BK6	—	BK6	BK2 BK3
	Normal	Middle	T14K8	BK8	T5K10	BK6	—	BK6	BK6
	Insufficient	Reduced	T5K10	BK11	BK8	BK8	—	BK6	BK6
Semi-finish and finish turning with uninterrupted cut	High	Highest	T30K4	T15K6	T15K6	BK2 BK3 BK6	BK2	BK2 BK3 BK6	BK2 BK3 BK6
	Normal	Middle	T15K6T	T14K8	T14K8	BK6	BK6	BK3 BK6	BK2 BK3 BK6
	Insufficient	Reduced	T15K6	T5K10	T5K10	BK6	BK6	BK6	BK6
Fine turning	High	Highest	T60K6	—	T30K4	BK2 BK3 BK6	BK2	BK2 BK3 BK6	BK2 BK3 BK6
	Normal	Middle	T30K4	—	T15K6T	BK2 BK3 BK6	BK2	BK2 BK3 BK6	BK2 BK3 BK6
	Insufficient	Reduced	T15K6T	—	T15K6	BK6	BK6	BK6	BK6
MILLING									
Rough milling	High	Highest	T15K6	T5K10	—	BK6	BK6	BK2 BK3 BK6	BK2 BK3 BK6
	Normal	Middle	T14K8	BK8	—	BK6	BK6	BK2 BK3 BK6	BK2 BK3 BK6
	Insufficient	Reduced	T5K10	BK8	—	BK8	BK8	BK6	BK6

Continuation

Kind and terms of machining operation	Rigidity of the system "Machine-tool-part-tool"	Comparative grade productivity	Carbon and alloy steel	Sintered carbide Grades suggested for machining					
				Special steels	Hardened steel	Cast iron $H_B \leq 240$	Cast iron of high hardness $H_B = 402-700$	Non-ferrous metals and alloys	Non-metallic materials
Finish milling	High	Highest	T30K4	T15K6	T30K4	BK2 BK3	BK2 BK3	BK2 BK3	BK2 BK3
	Normal	Middle	T15K6	T14K8	T15K6	BK6	BK6	BK2 BK3	BK2 BK3
	Insufficient	Reduced	T14K8	T5K10	T14K8	BK6	BK6	BK6	BK6
DRILLING AND BORING									
Drilling	High	Highest	T14K8	BK8	BK6	BK6	—	BK2 BK3	BK2 BK3
	Normal	Middle	T5K10	BK8	BK8	BK6	—	BK6	BK6
	Insufficient	Reduced	BK8	—	—	BK8	—	BK8	BK8
Boring	High	Highest	T15K6	T5K10	BK2 BK3	BK2 BK3	—	BK2 BK3	BK2 BK3
	Normal	Middle	T15K6	BK6	BK6	BK6	—	BK6	BK6
	Insufficient	Reduced	T14K8	BK8	BK8	BK8	—	BK6	BK6
COUNTER-BORING OF HOLES									
Rough counter-boring	High	Highest	T14K8	T5K10	—	BK2 BK3	BK2 BK3	BK2 BK3	BK2 BK3
	Normal	Middle	T5K10	BK6	—	BK6	BK6	BK6	BK6
	Insufficient	Reduced	BK8	BK8	—	BK8	BK8	BK8	BK6
Finish counter-boring	High	Highest	T30K4	T15K6	T15K6	BK2 BK3	—	BK2 BK3	BK2 BK3
	Normal	Middle	T15K6	T14K8	T14K8	BK6	—	BK6	BK6
	Insufficient	Reduced	T15K6	T5K10	T14K8	BK6	—	BK6	BK6
REAMING OF HOLES									
Hole reaming	High	Highest	T60K6	T30K4	T30K4	BK2 BK3	—	BK2 BK3	BK2 BK3
	Normal	Middle	T30K4	T15K6T	T15K6T	BK6	—	BK6	BK6
	Insufficient	Reduced	T15K6T	T15K6	T15K6	BK6	—	BK6	BK6

STANDARD PRODUCTS OF SINTERED CARBIDES

As a result of an extensive and thorough investigation of the demands of the industry there were designed and standardized the most rational shapes and sizes of Carbide Tips for tipping of metal cutting tools.

In accordance with the State Standards for Sintered Carbides applied for cutting metal and non-metallic materials (GOST 2209-55) our industry produces 38 various shapes of Sintered Carbide Tips including 351 different sizes, out of which 62 sizes are both right- and left-hand.

Thus the above mentioned Standards provide for 24 tip sizes more than the previous standards No. 2209-49 contained in our catalogue No. 08 and it is intended for meeting maximal requirements of the metal working industry.

For a number of shapes having same length and width the above Standards provides two thicknesses (size c). The tip thickness is taken depending on the wear of cutters.

For tools subjected to wear both along top and relief surfaces should be used thick carbide tips while for tools subjected to wear along relief surface only thin-carbide tips should be used.

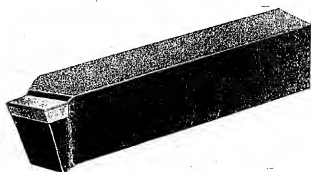
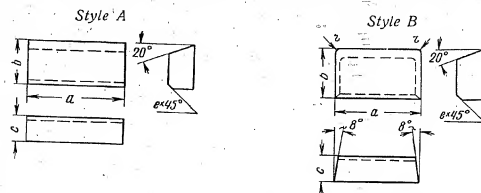
In the following tables each tip is marked with a number consisting of four figures, the first two indicating the number of tip shape and the last two—the ordinal number of tip according to its size.

Both right-hand and two-way tool tips (not subdivided into right-hand and left-hand) have uneven numbers, while left-hand tips have even numbers.

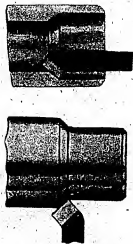
SHAPES AND DIMENSIONS OF STANDARD CARBIDE TIPS

SHAPE 01

For rough turning (straight and cranked) tools, broad nosed, boring and recessing turning tools



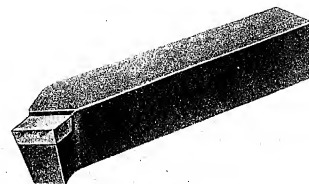
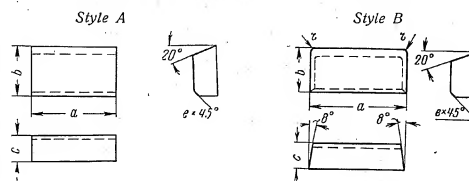
Examples of application of Shape 01



Tip No.	Dimensions in mm				
	a	b	c	e	r
0101	6	5	2,5	—	0,5
0103	8	6	3,0	1,0	0,5
0105	10	6	3,5	1,0	0,5
0107	12	8	4,5	1,0	0,5
0109	14	10	5,5	1,5	0,5
0111	16	10	5,5	1,5	0,5
0113	18	12	7,0	1,5	1
0115	20	12	7,0	1,5	1
0117	22	15	8,5	1,5	1
0119	25	15	8,5	1,5	1
0121	30	16	9,5	1,5	1
0123	40	18	10,5	2,0	1,5
0125	50	20	12,0	2,0	1,5
0127	60	22	12,0	2,0	1,5

SHAPE 02

For rough turning (straight and bent), broad nosed finishing, boring and recessing tools mostly subject to wear along the side relief



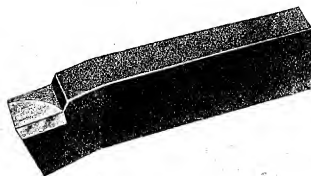
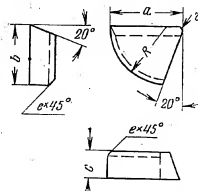
Examples of application of Shape 02



Tip No.	Dimensions in mm				
	a	b	c	e	r
0201	8	7	2,5	—	0,5
0203	10	8	3	1	0,5
0205	12	10	4	1	0,5
0223	14	12	4,5	1	0,5
0225	14	12	6	1,5	0,5
0227	18	16	6	1,5	0,5
0229	18	16	8	1,5	1
0231	22	18	7	1,5	1
0235	25	20	10	2	1
0237	35	20	10	2	1

SHAPE 06

For facing and boring tools, for boring blind-holes



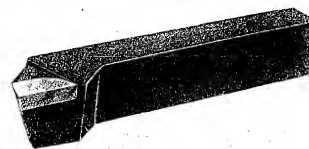
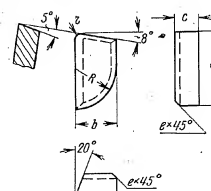
Examples of application of Shape 06



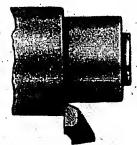
Tip No.		Dimensions in mm						
righthand	lefthand	a	b	c	R	e	r	
0601	—	8	7	2,5	6	—	0,5	
0603	0604	10	8	3	6	1	1	
0605	0606	12	10	4	10	1	1	
0607	0608	12	10	5	10	1	1	
0609	0610	16	14	5	14	1	1	
0611	0612	16	14	7	14	1,5	1	
0613	0614	20	18	6	17,5	1,5	1	
0615	0616	20	18	8	17,5	1,5	1	
0617	0618	25	20	7	20	1,5	1	
0619	0620	25	20	9	20	1,5	1	

SHAPE 07

For facing and rough turning tools

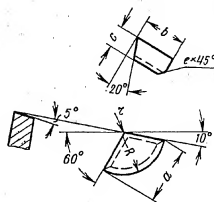


Examples of application of Shape 07

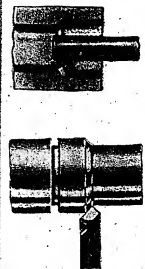


Tip No.		Dimensions in mm						
righthand	lefthand	a	b	c	R	r	e	
0701	—	10	6	2,5	6	1	—	
0703	0704	12	7	3	7	1	1	
0725	0726	15	9	5	9	1	1	
0729	0730	20	11	6	11	1	1,5	
0733	0734	25	14	8	14	1	1,5	

SHAPE 08

For boring and rough turning tools with $\varphi=60^\circ$; for Milling Head Blades

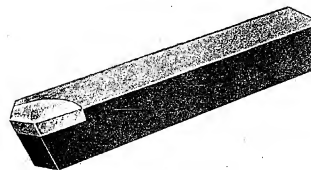
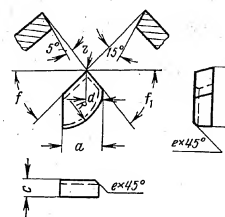
Examples of application of Shape 08



Tip No.		Dimensions in mm						
righthand	lefthand	a	b	c	R	e	f	
0817	0818	12	8	3,0	8	1,0	1,0	
0819	0820	12	8	4,5	8	1,0	1,0	
0821	0822	15	10	4,0	10	1,0	1,0	
0823	0824	15	10	5,5	10	1,5	1,0	
0825	0826	18	12	4,5	12,5	1,5	1,0	
0827	0828	18	12	6,0	12,5	1,5	1,0	

SHAPE 09

For Automatic screw machine tools



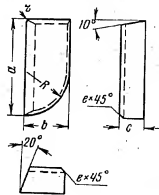
Examples of application of Shape 09



Tip No.		Dimensions in mm							angles	
righthand	lefthand	a	b	c	d	R	r	e	φ°	φ_1°
0909	0910	6	10	3	2	6	1	1	45	50
0911	0912	10	15	4	5	10	1	1	45	40
0913	0914	12	18	5	4	12,5	1	1	45	50
0915	0916	10	15	4	5	10	1	1	60	20
0917	0918	10	18	4	5,5	10	1	1	75	60

SHAPE 10

For straight rough turning tools and boring tools. For blades of side and end mills



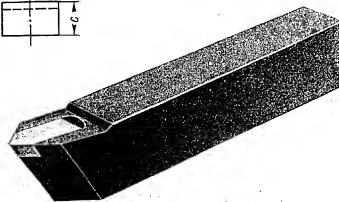
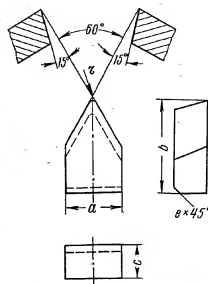
Examples of application of Shape 10



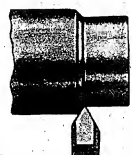
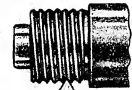
Tip No.		Dimensions in mm						
righthand	lefthand	a	b	c	R	r	e	
1001	—	6	5	2,5	5	0,5	—	
1003	1004	8	6	3	6	0,5	1	
1005	1006	10	6	3,5	6	1	1	
1007	1008	12	8	4,5	8	1	1	
1011	1012	16	10	5,5	10	1	1,5	
1015	1016	20	12	7	12,5	1	1,5	
1019	1020	25	15	8,5	15	1	1,5	
1021	1022	30	16	9,5	15	1	1,5	
1023	1024	40	18	10,5	17,5	1	2	
1025	1026	50	20	12	20	1,5	2	
1027	1028	12	8	3	8	1	1	
1029	1030	16	10	4	10	1	1	
1031	1032	18	12	4,5	12,5	1	1	
1033	1034	30	16	6	15	1	1,5	
1035	1036	40	18	8	17,5	1	1,5	
1037	1038	50	20	8	20	1,5	1,5	

SHAPE 11

For finish turning and thread cutting tools



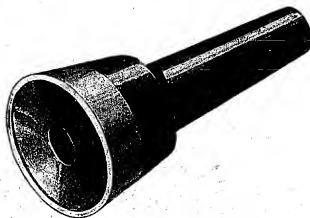
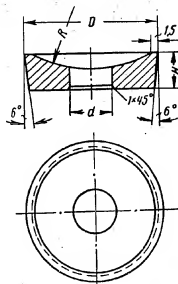
Examples of application of Shape 11



Tip No.	Dimensions in mm				
	a	b	c	r	e
1109	4	10	2,5	0,5	—
1101	6	14	3,5	0,5	1
1103	8	18	5	0,5	1
1105	10	20	6	0,5	1,5
1107	12	20	7	0,5	1,5

SHAPE 12

For cup-shaped (round nose and tyre turning) tools



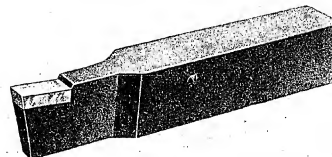
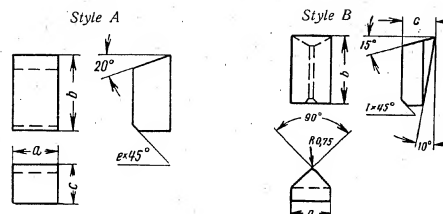
Examples of application of Shape 12



Tip No.	Dimensions in mm			
	D	H	d	R
1207	28,6	10	10	35
1209	32,0	10	10	35
1205	46,5	12	15	45

SHAPE 13

For parting and grooving tools



Examples of application of Shape 13

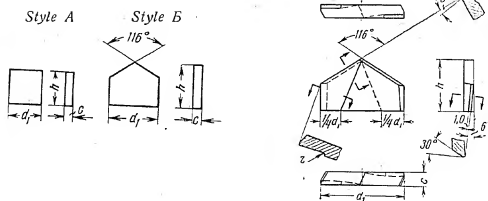


Tip No.	Dimensions in mm			
	a	b	c	e
1321	3	10	3	1
1323	4	12	4	1
1325	5	15	5	1
1307	6	15	6	1,5
1309	8	18	7	1,5
1311	10	20	8	1,5
1319	12	20	10	2

SHAPE 14

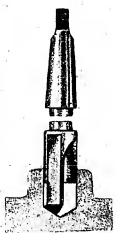
For twist drills and for drills with straight flutes

Style B



Tip No.	Style	Dimensions in mm			
		d_1	h	c	r
1401	A	3	4	0,6	—
1403	"	3,5	4,5	0,7	—
1405	"	4	4,5	0,8	—
1407	"	4,5	5	0,9	—
1409	"	5	5	0,9	—
1411	B	5,5	5,5	1,0	—
1413	"	6	6	1,5	—
1415	"	6,5	6	1,5	—
1417	"	7	6,5	1,6	—
1419	"	7,5	6,5	1,6	—
1421	"	8	7	1,8	—
1423	"	8,5	7	1,8	—
1425	"	9	8	2	—
1427	"	9,5	8	2	—
1429	"	10	9	2	—
1431	B	10,8	9	2	1
1433	"	11,8	10	2,5	1
1435	"	13	11	2,5	1
1437	"	14	12	2,5	1
1439	"	15	13	2,5	1
1441	"	16	14	3	1
1443	"	17	15	3	1,5

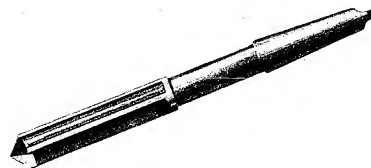
Examples of application of Shape 14



SHAPE 14

For twist drills and for drills with straight flutes

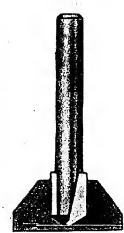
Continuation



Continuation

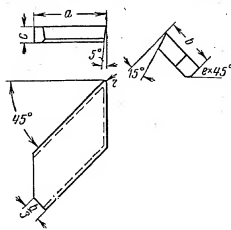
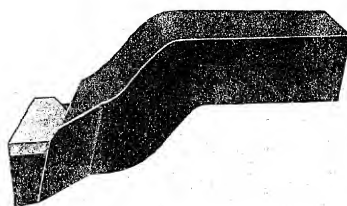
Tip No.	Style	Dimensions in mm			
		d_1	h	c	r
1445	B	18	16	3	1,5
1447	"	19	17	3	1,5
1449	"	20	18	3,5	1,5
1451	"	21	18	3,5	1,5
1453	"	22	18	3,5	1,5
1455	"	23	18	4	1,5
1457	"	24	18	4	1,5
1459	"	25	20	4,5	2
1461	"	26	20	4,5	2
1463	"	27,5	20	4,5	2
1465	"	28,5	20	4,5	2
1467	"	29,5	22	5	2
1469	"	30,5	22	5	2
1471	"	31,5	22	5	2
1473	"	33,5	24	5	2
1475	"	36,5	24	5	2
1477	"	39,5	24	5	2
1479	"	42	26	6	2
1481	"	44	26	6	2
1483	"	47	26	6	2
1485	"	50	28	6	2
1487	"	52	28	6	2

Example of application of Shape 14



SHAPE 15

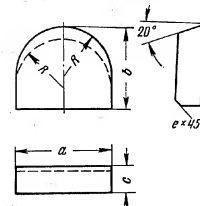
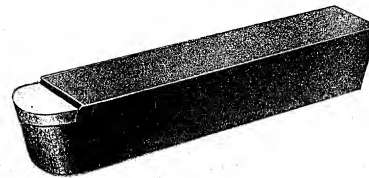
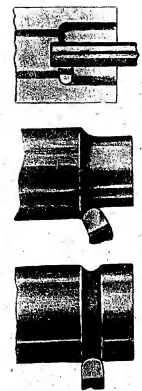
For chamfering tools and for tools used for machining dovetail slots

Examples of application
of Shape 15

Tip No.		Dimensions in mm					
righthand	lefthand	a	b	c	r	e	
1501	1502	12	8	3	1	1	
1503	1504	16	10	4	1	1	
1509	1510	20	16	5	1	1	
1511	1512	25	18	6	1	1,5	
1513	1514	30	20	6	1	1,5	

SHAPE 16

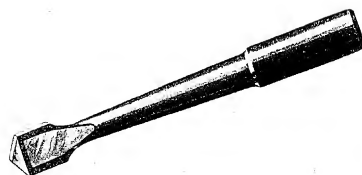
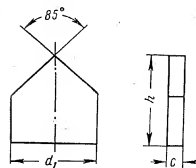
For round nose and tyre turning tools

Examples of application
of Shape 16

Tip No.	Dimensions in mm				
	a	b	c	R	e
1601	8	8	3	4	1
1603	10	10	3,5	5	1
1605	12	12	4,5	6	1
1621	16	14	5	8	1
1625	20	16	6	10	1,5
1629	25	20	7	12,5	1,5
1635	30	25	8	15	1,5

SHAPE 17

For drilling non-metallic materials



Example of application
of Shape 17

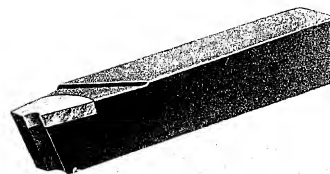
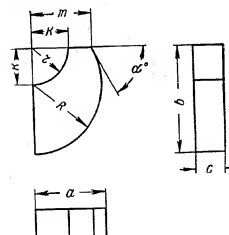


Tip No.	Dimensions in mm			Tip No.	Dimensions in mm		
	d_t	h	c		d_t	h	c
1701	5,5	8	0,8	1727	19	18	2,5
1703	6,5	8	1,0	1729	20	20	2,5
1705	7,5	9	1,2	1731	21	20	3,0
1707	8,5	10	1,5	1733	22	22	3,0
1709	9,5	10	1,5	1735	23	24	3,0
1711	10,8	12	1,8	1737	24	24	3,5
1713	11,8	12	1,8	1739	25	26	3,5
1715	13	14	2,0	1741	26	26	3,5
1717	14	14	2,0	1743	27,5	26	4,0
1719	15	15	2,2	1745	28,5	28	4,0
1721	16	15	2,2	1747	29,5	28	4,5
1723	17	16	2,5	1749	30,5	30	4,5
1725	18	18	2,5	1751	31,5	30	5,0

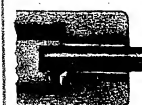
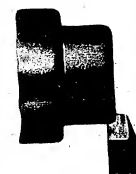
Note: Tips Nos. 1701-1709 inclued, are manufactured rectangular.

SHAPE 18

For round-nosed chamfering tools



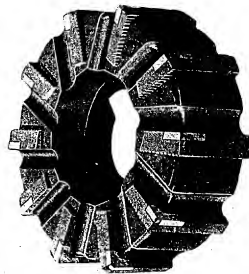
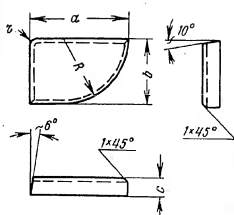
Examples of application
of Shape 18



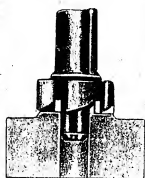
Tip No.	Dimensions in mm							Angle α°
	a	b	c	m	k	R	r	
1805	8	12	3	6	3	8	3	60
1807	10	15	4	8	5	10	5	60
1809	12	18	5	10	6	12	6	60
1811	16	22	5	—	10	15	10	—

SHAPE 20

For end mills and spot facers



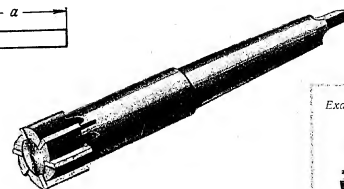
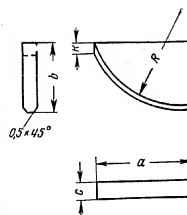
Examples of application of Shape 20



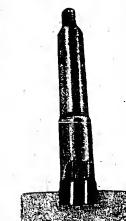
Tip No.		Dimensions in mm					
right-hand	left-hand	a	b	c	R	r	
2001	—	10	8	2,5	8	0,5	
2003	—	12	10	2,5	10	0,5	
2005	2006	15	12	3	12,5	0,5	
2007	2008	20	16	3,5	15	1	
2009	2010	25	20	4	20	1	
2011	2012	30	20	5	20	1	

SHAPE 21

For end and keyway mills. For counterborers for machining blind-holes



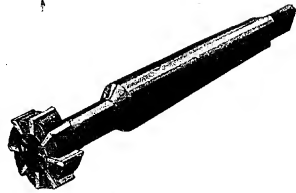
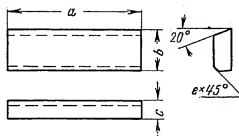
Examples of application of Shape 21



Tip No.	Dimensions in mm				
	a	b	c	k	R
2103	12	6	1,5	1	20
2105	15	3,5	2	1	20
2107	15	7	2	1	20
2109	20	4,5	2,5	2	25
2111	20	6	2,5	2	25
2125	20	6	3,5	—	10
2113	20	9	2,5	2	25
2117	25	8	3	3	30
2119	25	15	3	3	30
2121	30	10	4	3	30
2123	30	21	4	3	30
2127	35	10	5	3	30
2129	40	10	5	3	30
2131	45	12	6	3	30

SHAPE 24

For side milling cutters, end mills and T-slot cutters. For face-plain milling cutters



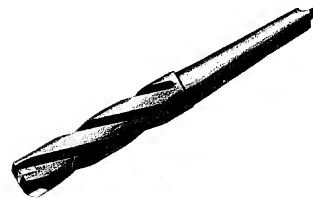
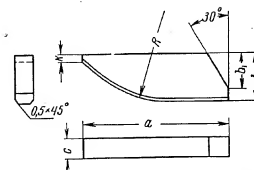
Example of application
of Shape 24



Tip No.	Dimensions in mm				Tip No.	Dimensions in mm			
	a	b	c	e		a	b	c	e
2401	6	7	3	1	2427	20	10	4	1
2403	8	4	3	1	2447	22	14	4	1
2405	8	7	3	1	2449	24	14	4	1
2407	10	5	3	1	2451	26	14	5	1
2437	10	10	3	1	2453	30	14	5	1
2411	12	6	3	1	2455	28	14	4	1
2439	12	12	3,5	1	2457	32	14	4	1
2415	14	7	3,5	1	2459	36	14	4	1
2441	14	12	3,5	1	2461	40	14	4	1
2419	16	7	3,5	1	2463	34	14	5	1
2443	16	12	3,5	1	2465	40	14	5	1
2423	18	7	3,5	1	2467	46	14	5	1
2445	18	12	3,5	1					

SHAPE 25

For counterborers for machining blind-holes



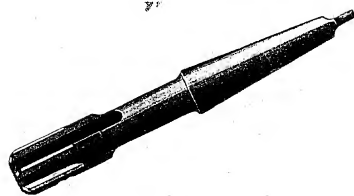
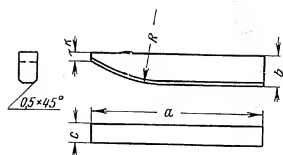
Example of application
of Shape 25



Tip No.	Dimensions in mm					
	a	b	c	b ₁	k	R
2501	15	4	2	2,5	1	15
2503	18	5	2,5	3,5	1	20
2505	20	6	3	5	1	25
2507	25	8	3,5	6	1,5	25
2509	30	10	4	8	1,5	30

SHAPE 26

For reamers



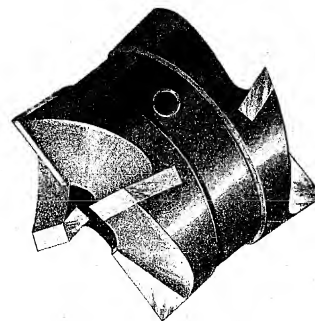
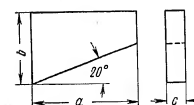
Example of application
of Shape 26



Tip No.	Dimensions in mm				
	a	b	c	R	R
2601	15	2,5	1,3	1	20
2603	18	3	1,5	1	25
2605	22	3,5	2	1	25
2607	25	4	2,5	1,5	30
2609	30	5	3	1,5	30

SHAPE 27

For face cutters

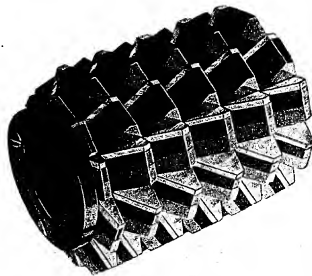
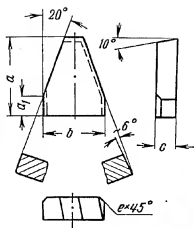


Example of application
of Shape 27

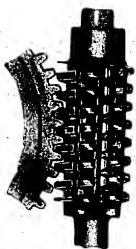


Tip No.	Dimensions in mm		
	a	b	c
2701	4,5	4,5	2
2703	6	5	2
2705	7,5	5	2,5
2707	10	6,5	2,5
2709	12	8	3
2711	14	9	3
2713	15,5	10	3
2715	18	12	3,5
2717	20	14	4
2719	22,5	15	4

SHAPE 30
For Hobs

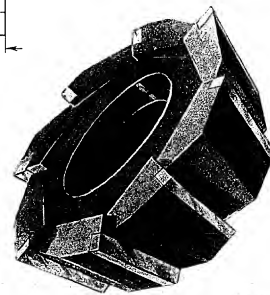
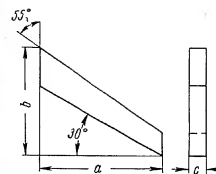


Example of application
of Shape 30



Tip No.	Dimensions in mm				
	a	b	c	a ₁	e
3001	13,5	11	4	3	1
3003	14,5	12	4,5	3	1
3005	16,5	13,5	5,0	4	1
3007	18,0	14,5	5,5	4	1
3009	21	17	6	5	1
3011	24	18,5	7	6	1,5
3013	26	21	7	6	1,5

SHAPE 31
For angle milling cutters

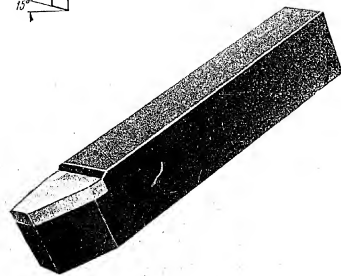
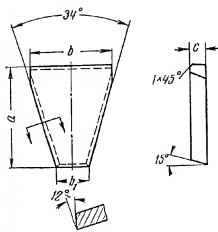


Example of application
of Shape 31



Tip No.	Dimensions in mm		
	a	b	c
3101	13	12,5	2,5
3103	15	14,5	3
3105	18	17,5	3
3107	20	19,5	3,5
3109	25	24,5	4
3111	34	31,5	5
3113	50	44	7

SHAPE 32
For machining V-belt pulleys

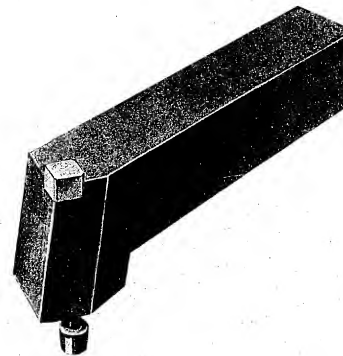
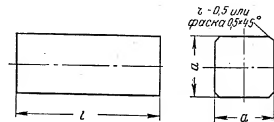


Example of application
of Shape 32



Tip No.	Dimensions in mm			
	a	b	b ₁	c
3207	20	12	4,0	5
3209	25	16	5,0	5
3211	30	20	6,5	6
3213	35	25	8,5	6
3215	42	35	13,5	8
3217	50	42	16,0	8

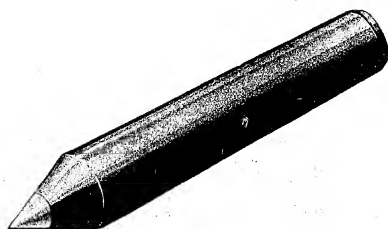
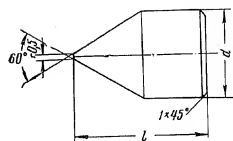
SHAPE 33
For rough turning tools with mechanical fastening applied on multitool lathes



Tip No.	Dimensions in mm	
	a	l
3301	6	15
3303	8	20
3305	10	25

SHAPE 34

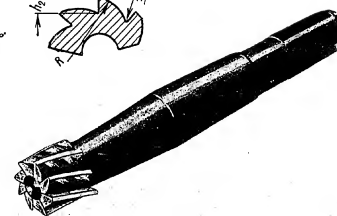
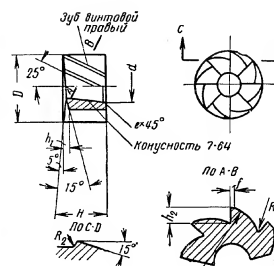
For centres for lathes and plain cylindrical Grinding Machines



Tip No.	Dimensions in mm	
	a	t
3401	8	15
3403	12	20
3405	15	24
3407	18	28

SHAPE 35

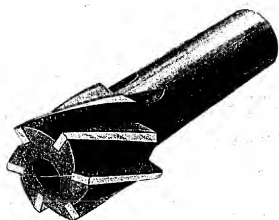
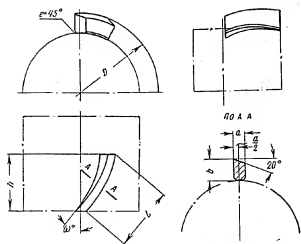
For Shell end Mills with helical flutes



Tip No.	Dimensions in mm										Number of teeth z
	D	H	d	h ₁	h ₂	R	R ₁	R ₂	t	e	
3501	10,5	10	4,3	1,3	2,1	7,5	0,3	0,3	0,4	0,8	6
3503	12,5	12	5,5	1,5	2,3	9,0	0,4	0,3	0,4	0,8	6
3505	14,5	8	6,5	1,5	2,5	11,0	0,5	0,3	0,5	0,8	6
3507	14,5	18	6,5	1,5	2,5	9,5	0,5	0,3	0,5	0,8	6
3509	16,5	10	7,8	1,8	2,7	11,5	0,5	0,3	0,6	1,0	6
3511	16,5	20	7,8	1,8	2,7	11,5	0,5	0,3	0,6	1,0	6
3513	19,0	10	9,2	2,0	3,0	12,8	0,8	0,3	0,6	1,1	8
3515	19,0	20	9,2	2,0	3,0	12,8	0,8	0,3	0,6	1,1	8
3517	21,0	15	10,5	2,0	3,2	14,4	0,8	0,4	0,8	1,3	8
3519	23,0	15	11,8	2,0	3,5	16,0	0,8	0,4	0,8	1,3	8

SHAPE 36

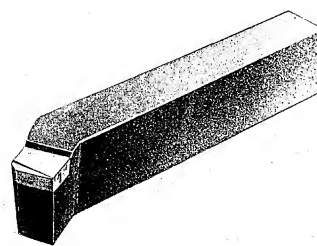
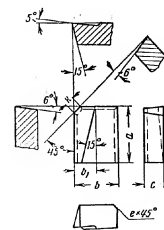
For Shell end Mills and end Mills with helical teeth dia. 10 to 120 mm



Tip No.	Nominal outside diameter of helical tip, mm	Tip spiral angle ω°	Dimensions in mm				
			a	b	l	h	e
3601	30	40	3,5	8,0	26	19,2	0,3
3603	50	40	4,3	8,5	28	21,5	0,5
3605	75	28	5,0	10,0	30	26,5	0,5
3607	100	25	5,0	10,0	30	27,0	0,8

SHAPE 37

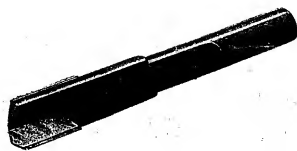
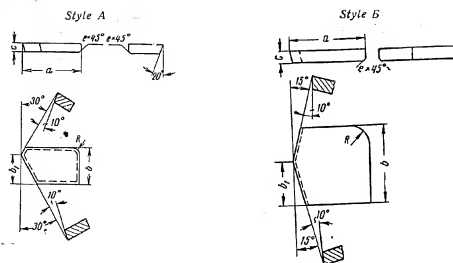
For rough turning tools operating with large feeds



Tip No.		Dimensions in mm					
righthand	lefthand	a	b	b ₁	c	k	e
3701	3702	10	8	4	4	2	1,0
3703	3704	12	10	5	5	2	1,0
3705	3706	14	12	6	7	3	1,5
3707	3708	18	14	6	9	3	1,5
3709	3710	22	15	6	10	3	1,5
3711	3712	25	16	8	12	4	2,0

SHAPE 38

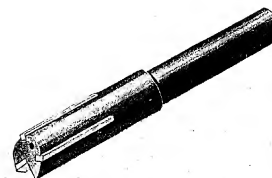
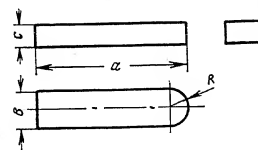
For depth boring drills



Tip No.	Type	Dimensions in mm					
		a	b	b ₁	c	R	e
3801	A	16	7	6,3	2,0	3,0	0,4
3803	A	20	10,6	9,5	3,0	4,0	0,5
3805	A	25	14,5	12,9	4,5	4,0	0,5
3807	A	30	18	16,0	4,5	4,0	0,5
3809	B	25	22	14,0	4,5	8,0	0,8
3811	B	30	28	17,0	5,0	8,0	0,8
3813	B	35	33	20,0	6,0	10,0	0,8
3815	B	40	40	23,0	6,0	10,0	0,8

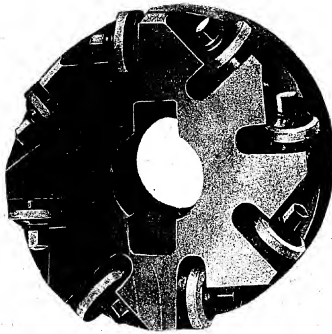
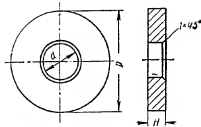
SHAPE 39

For guide bushings for depth boring drills



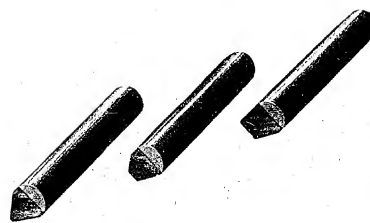
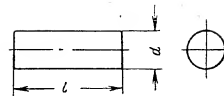
Tip No.	Dimensions in mm			
	a	b	c	R
3901	18	2,5	2,5	1,25
3903	20	3,0	3,0	1,5
3905	25	5,0	4,0	2,5
3907	30	6,0	5,0	3,0
3909	35	8,0	5,0	4,0
3911	40	10,0	5,0	5,0

SHAPE 40
For face mills



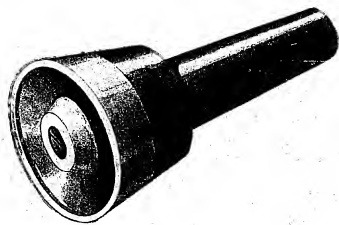
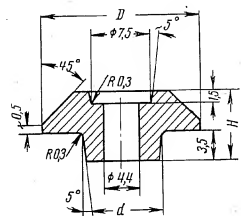
Tip No.	Dimensions in mm		
	D	H	d
4001	35	6	15,5
4003	45	7	15,5

SHAPE 41
For fine boring tools



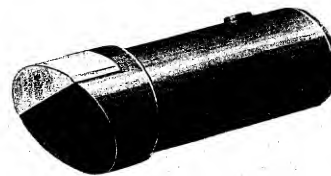
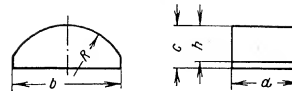
Tip No.	Dimensions in mm	
	d	l
4101	3	10
4103	4	12
4105	5	15

SHAPE 42
Chipbreakers for shape 12



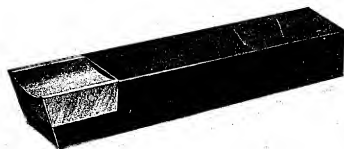
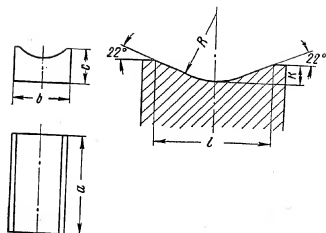
Tip No.	Dimensions in mm		
	D	H	d
4201	16	7,0	10
4203	18	8,0	10
4205	20	8,5	10

SHAPE 43
For round faced tools



Tip No.	Dimensions in mm				
	a	b	c	h	R
4301	12	7,8	3,5	3,0	4
4303	16	11,0	5,0	4,0	6
4305	16	15,0	5,5	4,5	8
4307	16	19,0	7,5	6,5	10
4309	18	22,5	9,0	8,0	12
4311	18	26,0	10,5	9,0	14
4313	18	30,0	12,0	10,0	16

SHAPE 44
For chamfering tools



Tip No.	Dimensions in mm					
	a	b	c	l	R	R
4401	12	6	4,5	5	0,9	2
4403	15	8	4,5	7	1,0	4
4405	18	10	5,5	9	1,4	5
4407	20	12	7,0	10	1,6	6

Approximate weight of tips acc. GOST 2209-55

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK5	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
Weight of tips style A.										
	Shank section									
0101	8×12	1,1	1,1	1,0	1,0	0,9	0,8	0,8	0,7	0,5
0103	10×16	1,9	1,9	1,8	1,8	1,6	1,4	1,4	1,2	0,8
0105	12×20	2,7	2,7	2,6	2,6	2,3	2,1	2,0	1,7	1,2
0107	16×16	5,8	5,8	5,7	5,6	4,8	4,4	4,3	3,8	3,1
0109	16×25	10,2	10,0	9,9	9,8	8,7	7,8	7,6	6,5	4,5
0111	20×20	—	—	11,3	11,2	9,6	8,8	8,6	7,5	5,5
0113	20×30	20,3	20,0	19,7	19,5	17,0	15,5	15,0	12,9	9,0
0115	25×25	—	—	21,5	21,3	18,2	16,6	16,0	14,3	10,4
0117	25×40	37,0	36,5	36,0	35,5	31,5	28,0	27,5	23,5	—
0119	30×45	43,0	42,5	41,5	41,0	36,0	32,5	32,0	27,5	—
0121	40×60	—	—	60,0	59,0	52,0	47,0	45,5	—	—
0123	50×80	—	—	99,0	98,0	87,0	78,0	76,0	—	—
0125	60×100	—	—	156	154	136	122	119	—	—
0127	65×100	—	—	213	210	186	167	163	—	—
Weight of tips style A.										
0201	8×12	2,0	2,0	1,9	1,9	1,7	1,5	1,5	1,3	0,9
0203	10×16	3,2	3,2	3,1	3,1	2,7	2,5	2,4	2,1	1,5
0205	12×20	6,5	6,4	6,3	6,2	5,5	4,9	4,8	4,1	2,8
0223	16×25	10,4	10,3	10,1	10,0	8,8	7,9	7,7	6,6	4,6
0225	16×25	13,6	13,5	13,2	13,0	11,5	10,5	10,0	8,6	6,0
0227	20×30	24,0	23,7	23,3	23,0	20,5	18,5	18,0	15,3	10,6
0229	20×30	31,5	31,0	30,5	30,0	26,5	24,0	23,0	20,0	—
0231	25×40	38,5	38,0	37,5	37,0	32,5	29,5	28,5	24,5	—
0235	30×45	68,0	67,0	66,0	65,0	57,0	52,0	50,0	—	—
0237	40×60	—	—	92,0	91,0	80,0	72,0	70,0	—	—
0305	20×30	—	—	—	22,5	20,0	18,0	17,5	—	—
0306	20×30	—	—	—	—	—	—	—	—	—
0309	25×40	—	—	—	37,5	33,0	30,0	29,0	—	—
0310	25×40	—	—	—	—	—	—	—	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
0313	Shank section									
0314	30×45	—	—	—	70	62	56	54	—	—
0315	40×60	—	—	—	112	99	89	87	—	—
0413	25×40	—	—	36,0	35,5	31,5	28,0	27,5	—	—
0414	30×45	—	—	57,0	56,0	49,5	44,5	43,5	—	—
0417	25×40	—	—	45,0	44,5	39,5	35,5	34,5	—	—
0421	30×45	—	—	73,0	72,0	64,0	57,0	56,0	—	—
0422										
0423										
0424										
0601	10×16	—	—	1,0	1,0	0,9	0,8	0,7	—	—
0603	12×20	—	—	2,2	2,2	1,9	1,7	1,5	—	—
0604	16×25	—	—	4,0	3,9	3,3	3,0	2,6	—	—
0605	16×25	—	—	4,0	3,9	3,3	3,0	2,6	—	—
0606	16×25	—	—	5,1	5,0	4,3	3,9	3,3	—	—
0607	16×25	—	—	5,1	5,0	4,3	3,9	3,3	—	—
0608	20×30	—	—	9,3	9,2	7,9	7,2	6,1	—	—
0609	20×30	—	—	9,3	9,2	7,9	7,2	6,1	—	—
0610	20×30	—	—	12,0	11,8	10,2	9,2	7,8	—	—
0611	25×40	—	—	17,3	17,1	14,6	13,3	11,3	—	—
0612	25×40	—	—	22,2	22,0	18,8	17,1	14,5	—	—
0613	30×45	—	—	31,2	29,9	25,6	23,3	19,7	—	—
0614	30×45	—	—	37,4	36,9	31,6	28,7	24,4	—	—
0615										
0616										
0617										
0618										
0619										
0620										

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
0701	Shank section									
0703	10×16	1,3	1,3	1,3	1,3	1,1	1,0	1,0	0,9	0,6
0704	12×20	2,7	2,7	2,6	2,6	2,2	2,0	2,0	1,7	1,2
0725	16×25	7,1	7,0	6,8	6,7	5,7	5,2	5,2	4,5	3,2
0726	20×30	13,9	13,8	13,5	13,3	11,4	10,4	10,2	8,8	6,0
0729	25×40	28,8	28,6	28,0	27,6	23,6	21,5	21,1	—	—
0730										
0733										
0734										
0817	16×25	—	—	2,6	2,6	2,2	2,0	2,0	—	—
0818	16×25	—	—	3,9	3,8	3,3	3,0	2,9	—	—
0819	20×30	—	—	5,6	5,5	4,7	4,3	4,2	—	—
0820	20×30	—	—	7,1	7,0	6,0	5,4	5,3	—	—
0821	25×40	—	—	9,1	9,0	7,7	7,0	6,9	—	—
0822	25×40	—	—	10,6	10,5	9,1	8,3	8,1	—	—
0823										
0824										
0825										
0826										
0827										
0828										
0909	10×16	2,1	2,1	2,0	2,0	1,7	1,6	1,5	1,3	—
0910	12×20	7,3	7,2	7,1	7,0	6,1	5,6	5,4	4,6	—
0911	16×16	11,9	11,8	11,6	11,4	9,8	8,9	8,7	7,5	—
0912	12×20									
0913	16×16									
0914										

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK5	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
0915	Shank section 12×20 16×16 16×25									
0916		5.0	5.0	4.9	4.8	4.2	3.7	3.6	3.2	—
0917		6.7	6.6	6.5	6.4	5.6	5.1	5.0	4.2	—
0918										
1001	6×10 8×12	0.8	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.4
1003	8×12									
1004	10×16	1.5	1.5	1.4	1.4	1.2	1.1	1.1	0.9	0.6
1005	10×16									
1006	12×20	2.0	2.0	1.9	1.9	1.6	1.5	1.5	1.3	0.9
1007	16×25	4.7	4.7	4.6	4.5	3.9	3.6	3.5	3.1	2.1
1008										
1011	20×30	9.4	9.3	9.2	9.1	7.8	7.2	7.0	—	—
1012										
1015	25×40	17.8	17.7	17.5	17.3	14.8	13.6	13.3	—	—
1016										
1019	30×45	33.6	33.4	32.8	33.3	27.6	25.1	24.7	—	—
1020										
1021	40×60	—	—	48.5	47.8	40.8	37.2	36.6	—	—
1022										
1023	50×80	—	—	85	83	79	65	64	—	—
1024										
1025	60×100	—	—	135	133	113	106	102	—	—
1026										
1027	—	—	—	3.1	3.0	2.6	2.3	2.3	—	—
1028										
1029	—	—	—	6.8	6.7	5.7	5.2	5.1	—	—
1030										
1031	—	—	—	9.8	9.7	8.3	7.5	7.4	—	—
1032										

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
1033	Shank section — — — —									
1034		—	—	30.8	30.4	26.0	23.7	23.2	—	—
1035		—	—	64	64	54	49.5	48.5	—	—
1036										
1037	—	—	—	86	89	76	69	68	—	—
1038										
1109	8×12 10×16	1.3	1.3	1.2	—	—	1.0	0.9	0.8	0.6
1101	10×16 12×20	3.3	3.2	3.1	—	—	2.6	2.4	2.1	1.4
1103	12×20 16×25	7.9	7.8	7.6	—	—	6.0	5.8	5.0	3.5
1105	16×25 20×30	2.7	12.5	12.3	—	—	9.5	9.2	8.0	5.5
1107	20×30 25×40	16.5	16.3	16.0	—	—	12.5	12.0	10.5	7.2
1207	—	—	—	—	53	46.0	42.0	21.0	—	—
1209	—	—	—	—	82	72	66	65	—	—
1205	—	—	—	—	212	184	168	165	—	—
Weight of tips style A.										
1321	10×16	—	—	1.2	1.2	1.1	1.0	0.9	—	—
1323	10×16 12×20	—	—	2.6	2.5	2.2	2.0	1.9	—	—
1325	12×20 16×25	—	—	5.0	4.9	4.3	3.9	3.8	—	—
1307	16×25 20×30	—	—	7.2	7.0	6.2	5.6	5.4	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
1309	Shank section 20×30 25×40	—	—	13.5	13.0	11.5	10.5	10.0	—	—
1311	25×40 30×45	—	—	21.5	21.0	19.0	17.0	16.5	—	—
1319	25×40 30×45	—	—	31.0	30.5	27.0	28.0	24.0	—	—
1401	Drill diameter 2.5	—	—	0.1	0.1	0.1	0.1	0.1	—	—
1403	3	—	—	0.2	0.2	0.2	0.1	0.1	—	—
1405	3.5	—	—	0.2	0.2	0.2	0.2	0.2	—	—
1407	4	—	—	0.3	0.3	0.3	0.3	0.3	—	—
1409	4.5	—	—	0.4	0.4	0.4	0.3	0.3	—	—
1411	5	—	—	0.4	0.4	0.4	0.3	0.3	—	—
1413	5.5	—	—	0.7	0.7	0.6	0.5	0.5	—	—
1415	6	—	—	0.8	0.8	0.7	0.6	0.6	—	—
1417	6.5	—	—	0.9	0.9	0.8	0.7	0.7	—	—
1419	7	—	—	1.0	1.0	0.9	0.8	0.8	—	—
1421	7.5	—	—	1.3	1.3	1.1	1.0	1.0	—	—
1423	8	—	—	1.4	1.4	1.2	1.1	1.1	—	—
1425	8.5	—	—	1.7	1.7	1.5	1.3	1.3	—	—
1427	9	—	—	1.8	1.8	1.6	1.4	1.4	—	—
1429	9.5	—	—	2.1	2.1	1.9	1.7	1.6	—	—
1431	10	—	—	2.3	2.3	2.0	1.8	1.7	—	—
1433	11	—	—	3.5	3.5	3.1	2.7	2.6	—	—
1435	12	—	—	4.3	4.2	3.7	3.3	3.2	—	—
1437	13	—	—	4.9	4.8	4.2	3.8	3.7	—	—
1439	14	—	—	5.9	5.8	5.1	4.6	4.5	—	—
1441	15	—	—	8.0	7.9	7.0	6.3	6.1	—	—
1443	16	—	—	9.2	9.1	8.0	7.2	7.0	—	—
1445	17	—	—	10.5	10.2	9.0	8.1	7.9	—	—
1447	18	—	—	12.0	11.5	10.2	9.1	8.9	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
	Drill diameter									
1449	19	—	—	15.5	15.0	13.3	12.0	11.5	—	—
1451	20	—	—	16.0	15.5	13.8	12.5	12.0	—	—
1453	21	—	—	16.5	16.0	14.2	13.0	12.5	—	—
1455	22	—	—	19.5	19.0	17.0	15.0	14.5	—	—
1457	23	—	—	20.5	20.0	17.5	16.0	15.5	—	—
1459	24	—	—	26.5	26.0	23.0	21.0	20.5	—	—
1461	25	—	—	27.5	27.0	24.0	21.5	21.0	—	—
1463	26	—	—	28.5	28.0	24.5	22.0	21.5	—	—
1465	27	—	—	30.5	30.0	26.5	24.1	23.0	—	—
1467	28	—	—	37.5	37.0	32.5	30.0	28.5	—	—
1469	29	—	—	38.5	38.0	33.5	30.5	29.0	—	—
1471	30	—	—	39.5	38.5	34.0	31.0	29.5	—	—
1473	32	—	—	45.5	44.8	38.3	34.9	34.3	—	—
1475	35	—	—	49.8	49.1	42.0	38.3	37.5	—	—
1477	38	—	—	52	51	43.4	39.5	38.8	—	—
1479	40	—	—	71	70	60	55	54	—	—
1481	42	—	—	74	73	62	57	56	—	—
1483	45	—	—	77	76	65	59	58	—	—
1485	48	—	—	88	87	74	68	67	—	—
1487	50	—	—	90	89	76	69	68	—	—
1501	Shank section									
1502	12×20	—	—	5.4	5.3	4.7	4.2	4.1	—	—
1503	16×25	—	—	12.5	12.0	11.0	9.5	9.3	—	—
1504										
1509	20×30	—	—	28.5	28.0	25.0	22.5	22.0	—	—
1510										
1511	25×40	—	—	49.5	48.6	43.0	38.5	38.0	—	—
1512										
1513	30×45	—	—	68.0	67.2	58.7	53.4	52.2	—	—
1514										

Continuation

Continued										
Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
	Shank section									
1601	8×12	—	—	2.1	2.1	1.9	1.7	1.6	—	—
1603	10×16	—	—	4.2	4.1	3.6	3.3	3.2	—	—
1605	12×20	—	—	7.6	7.5	6.6	6.0	5.8	—	—
1621	16×25	—	—	13.0	12.5	11.5	10.0	9.7	—	—
1625	20×30	—	—	22.5	22.0	19.5	17.5	17.0	—	—
1629	25×40	—	—	41.5	41.0	36.5	32.5	32.0	—	—
1635	30×45	—	—	72	71	61	55	54	—	—
	Drill diameter									
1701	5	—	—	0.5	0.5	—	—	—	—	—
1703	6	—	—	0.8	0.8	—	—	—	—	—
1705	7	—	—	1.3	1.3	—	—	—	—	—
1707	8	—	—	1.9	1.9	—	—	—	—	—
1709	9	—	—	2.1	2.1	—	—	—	—	—
1711	10	—	—	2.6	2.6	—	—	—	—	—
1713	11	—	—	2.7	2.7	—	—	—	—	—
1715	12	—	—	4.1	4.0	—	—	—	—	—
1717	13	—	—	4.2	4.1	—	—	—	—	—
1719	14	—	—	5.3	5.2	—	—	—	—	—
1721	15	—	—	5.6	5.5	—	—	—	—	—
1723	16	—	—	7.1	7.0	—	—	—	—	—
1725	17	—	—	8.6	8.5	—	—	—	—	—
1727	18	—	—	8.9	8.8	—	—	—	—	—
1729	19	—	—	10.6	10.5	—	—	—	—	—
1731	20	—	—	13.3	13.1	—	—	—	—	—
1733	21	—	—	15.5	15.3	—	—	—	—	—
1735	22	—	—	17.9	17.6	—	—	—	—	—
1737	23	—	—	21.5	21.2	—	—	—	—	—
1739	24	—	—	24.5	24.1	—	—	—	—	—
1741	25	—	—	25.2	24.8	—	—	—	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
	Drill diameter									
1743	26	—	—	30.0	29.6	—	—	—	—	—
1745	27	—	—	33.8	33.3	—	—	—	—	—
1747	28	—	—	38.7	38.1	—	—	—	—	—
1749	29	—	—	43.3	42.7	—	—	—	—	—
1751	30	—	—	49.7	49.0	—	—	—	—	—
1805	—	—	—	3.3	3.2	2.8	2.6	2.5	—	—
1807	—	—	—	6.8	6.7	5.9	5.3	5.2	—	—
1809	—	—	—	12.6	12.4	10.8	9.9	9.6	—	—
1811	—	—	—	19.2	19.0	16.6	15.1	14.8	—	—
2001	—	—	—	1.8	1.8	1.5	1.4	1.4	—	—
2003	—	—	—	2.8	2.8	2.4	2.2	2.1	—	—
2005	—	—	—	5.8	5.7	4.9	4.4	4.3	—	—
2006	—	—	—	—	—	—	—	—	—	—
2007	—	—	—	12.6	12.4	10.6	9.6	9.5	—	—
2008	—	—	—	—	—	—	—	—	—	—
2009	—	—	—	22.8	22.5	19.2	17.5	17.2	—	—
2010	—	—	—	—	—	—	—	—	—	—
2011	—	—	—	35.2	33.7	28.8	26.2	25.7	—	—
2012	—	—	—	—	—	—	—	—	—	—
2103	—	—	—	1.1	1.1	0.9	0.8	0.8	—	—
2105	—	—	—	1.3	1.3	1.1	1.0	1.0	—	—
2107	—	—	—	2.3	2.3	2.0	1.8	1.8	—	—
2109	—	—	—	3.2	3.2	2.7	2.5	2.4	—	—
2111	—	—	—	3.7	3.6	3.1	2.8	2.7	—	—
2125	—	—	—	5.6	5.5	4.8	4.4	4.3	—	—
2113	—	—	—	5.2	5.1	4.4	4.0	3.9	—	—
2115	—	—	—	6.0	5.8	5.0	4.6	4.5	—	—
2117	—	—	—	7.6	7.5	6.4	5.8	5.7	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
2119	—	—	—	12.8	12.6	10.8	9.8	9.6	—	—
2121	—	—	—	15.3	15.1	12.9	11.8	11.5	—	—
2123	—	—	—	29.6	29.2	25.0	22.7	22.3	—	—
2127	—	—	—	17.7	17.2	14.7	13.4	13.1	—	—
2129	—	—	—	25.2	24.8	21.2	19.3	18.9	—	—
2131	—	—	—	38.5	37.9	32.4	29.5	28.9	—	—
2401	—	—	—	1.7	1.7	1.5	1.3	1.3	—	—
2403	—	—	—	1.1	1.1	1.0	0.9	0.9	—	—
2405	—	—	—	2.2	2.2	1.9	1.7	1.7	—	—
2407	—	—	—	1.8	1.8	1.6	1.4	1.4	—	—
2437	—	—	—	4.1	4.0	3.6	3.3	3.1	—	—
2411	—	—	—	2.8	2.7	2.5	2.2	2.2	—	—
2439	—	—	—	6.9	6.8	6.0	5.4	5.3	—	—
2415	—	—	—	4.7	4.6	4.1	3.6	3.6	—	—
2441	—	—	—	8.2	8.1	7.2	6.4	6.3	—	—
2419	—	—	—	5.1	5.0	4.4	4.0	3.9	—	—
2443	—	—	—	9.1	9.0	8.0	7.1	6.9	—	—
2428	—	—	—	5.9	5.8	5.1	4.6	4.5	—	—
2445	—	—	—	10.6	10.4	9.3	8.3	8.1	—	—
2427	—	—	—	11.0	10.8	9.6	8.6	8.4	—	—
2447	—	—	—	16.5	16.2	14.5	13.0	12.5	—	—
2449	—	—	—	19.0	18.5	16.5	14.5	14.0	—	—
2451	—	—	—	25.0	24.5	21.5	19.5	19.0	—	—
2453	—	—	—	29.0	28.5	25.0	22.5	22.0	—	—
2455	—	—	—	22.2	21.6	19.4	16.9	16.4	—	—
2457	—	—	—	25.4	24.7	22.0	19.4	18.7	—	—
2459	—	—	—	28.6	27.8	24.7	21.8	21.0	—	—
2461	—	—	—	31.7	30.8	27.5	24.2	23.4	—	—
2468	—	—	—	32.9	32.3	28.4	25.6	25.0	—	—
2465	—	—	—	38.8	38.0	33.4	30.1	29.4	—	—
2467	—	—	—	44.5	43.6	38.4	34.6	33.8	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
Counterborer diameter										
2501	18	1,5	1,5	1,4	1,4	1,2	1,1	1,1	—	—
2503	18—25	2,5	2,5	2,4	2,4	2,1	1,9	1,8	—	—
2505	25—50	4,0	4,0	3,9	3,8	3,4	3,0	2,9	—	—
2507	50—75	8,1	8,0	7,9	7,8	6,9	6,2	6,0	—	—
2509	over 75	13,5	13,4	13,2	13,0	11,5	10,5	10,0	—	—
Reamer diameter										
2601	10	0,7	0,7	0,6	—	—	—	0,5	0,4	0,3
2603	10—15	1,1	1,1	1,0	—	—	—	0,8	0,7	0,5
2605	15—20	2,3	2,2	2,0	—	—	—	1,5	1,3	0,9
2607	20—25	3,7	3,6	3,1	—	—	—	2,4	2,1	1,5
2609	over 25	6,7	6,6	6,1	—	—	—	4,6	4,0	2,8
Counterborer diameter										
2701	D=14 d= 5,5	—	—	0,5	0,5	0,4	0,4	0,4	—	—
2703	D=17 d= 5,5 & 7	—	—	0,7	0,7	0,6	0,5	0,5	—	—
2705	D=20 d= 7	—	—	1,0	1,0	0,9	0,8	0,8	—	—
2707	D=24 & 26 d= 8	—	—	1,7	1,7	1,6	1,3	1,3	—	—
2709	D=30, 32&35 d=10 & 14	—	—	3,0	3,0	2,6	2,3	2,2	—	—
2711	D=38 & 42 d=14 & 16	—	—	4,0	3,9	3,3	3,0	2,9	—	—
2713	D=45 d=15	—	—	4,9	4,8	4,1	3,7	3,6	—	—
2715	D=52 d=18	—	—	8,0	7,9	6,8	6,1	6,0	—	—
2717	D=60, 65&70 d=22, 27 & 32	—	—	12,2	12,0	10,5	9,3	9,1	—	—
2719	D=75 d=32	—	—	14,4	14,2	11,1	11,1	10,8	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
Milling Cutter Module										
3001	4	—	—	6.1	6.0	5.3	4.8	4.6	—	—
3003	4, 4.6 & 4.5	—	—	7.9	7.8	6.9	6.2	6.0	—	—
3005	5	—	—	11.6	11.4	9.7	8.9	8.7	—	—
3007	5, 5	—	—	14.6	14.4	12.3	11.2	11.0	—	—
3009	6 & 6.5	—	—	22.5	22.0	19.5	17.5	17.0	—	—
3011	7	—	—	32.0	31.5	28.0	25.0	24.5	—	—
3013	8	—	—	39.0	38.5	34.0	30.5	30.0	—	—
Milling Cutter diameter										
3101	40	—	—	3.7	3.6	—	—	—	—	—
3103	50	—	—	5.5	5.4	—	—	—	—	—
3105	65	—	—	7.2	7.1	—	—	—	—	—
3107	80	—	—	12.1	11.9	—	—	—	—	—
3109	100	—	—	21.1	20.8	—	—	—	—	—
3111	130	—	—	43.4	42.8	—	—	—	—	—
3113	160	—	—	114.0	113.0	—	—	—	—	—
Form										
3207	0	—	—	9.2	9.1	—	—	—	—	—
3209	A	—	—	14.0	13.5	—	—	—	—	—
3211	B	—	—	29.0	28.5	—	—	—	—	—
3213	B	—	—	41.5	40.5	—	—	—	—	—
3215	Г	—	—	110	108	—	—	—	—	—
3217	Д	—	—	153	151	—	—	—	—	—
Form										
3301	—	8.2	8.1	7.9	7.8	6.9	6.2	6.0	—	—
3303	—	19.8	19.4	19.0	18.5	16.5	15.0	14.5	—	—
3305	—	37.5	37.0	36.5	36.0	32.0	28.5	28.0	—	—
Form										
3401	Morse Taper 1&2	—	—	7.6	7.5	6.5	—	—	—	—
3403	Morse Taper 3	—	—	21.5	21.0	18.5	—	—	—	—
3405	Morse Taper 4	—	—	37.5	37.0	33.0	—	—	—	—
3407	Morse Taper 5&6	—	—	66	65	58	—	—	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6, T15K6T	T30K4	T60K6
Milling Cutter diameter										
3501	10	—	—	6.3	6.2	5.5	4.9	4.8	—	—
3503	12	—	—	11.5	11.0	9.7	8.7	8.5	—	—
3505	14	—	—	11.0	10.5	9.8	8.3	8.1	—	—
3507	14	—	—	24.5	24.0	21.0	19.0	18.5	—	—
3509	16	—	—	15.5	15.0	13.5	12.0	11.5	—	—
3511	16	—	—	32.5	32.0	28.5	25.5	24.5	—	—
3513	18	—	—	17.5	17.0	15.0	13.5	13.0	—	—
3515	18	—	—	36.5	36.0	32.0	28.5	28.0	—	—
3517	20	—	—	39.5	39.0	34.5	31.0	30.0	—	—
3519	22	—	—	43.0	42.5	37.5	33.5	32.5	—	—
Shank section										
3601	20—40	—	—	—	9.6	8.5	7.6	7.4	—	—
3603	40—60	—	—	—	12.5	11.0	9.9	9.6	—	—
3605	60—90	—	—	—	17.5	15.5	14.0	13.5	—	—
3607	90—120	—	—	—	17.5	15.5	14.0	13.5	—	—
Shank section										
3701	10×16	—	—	—	—	2.3	2.3	2.2	—	—
3702	10×16	—	—	—	—	2.3	2.3	2.2	—	—
3703	12×20	—	—	—	—	5.0	4.6	4.5	—	—
3704	12×20	—	—	—	—	5.0	4.6	4.5	—	—
3705	16×25	—	—	—	—	10.5	9.6	9.5	—	—
3706	16×25	—	—	—	—	10.5	9.6	9.5	—	—
3707	20×30	—	—	—	—	21.0	19.1	18.9	—	—
3708	20×30	—	—	—	—	21.0	19.1	18.9	—	—
3709	25×40	—	—	—	—	30.5	27.8	27.4	—	—
3710	25×40	—	—	—	—	30.5	27.8	27.4	—	—
3711	30×45	—	—	—	—	42.0	38.2	37.8	—	—
3712	30×45	—	—	—	—	42.0	38.2	37.8	—	—
Drill diameter										
3801	7.0—12.7	—	—	—	2.7	2.3	2.1	2.1	—	—
3803	12.5—20.0	—	—	—	10.0	8.6	6.2	6.2	—	—
3805	20.0—27.0	—	—	—	20.2	17.6	15.8	15.7	—	—

Continuation

Tip No.	Tool sizes (suggested) mm	Approximate tip weight in gr. of grade								
		BK2	BK3	BK6	BK8	T5K10	T14K8	T15K6 T15K6T	T30K4	T60K6
	Drill diameter									
3807	27.0—34.0	—	—	—	37.1	32.1	28.7	28.5	—	—
3809	33.0—40.0	—	—	—	32.6	28.2	25.3	25.1	—	—
3811	41.0—52.0	—	—	—	56	48.1	43.1	42.7	—	—
3813	53.0—64.0	—	—	—	97	84	75	75	—	—
3815	65.0—75.0	—	—	—	127	110	99	98	—	—
3901	—	1.7	1.7	1.7	1.6	—	—	—	—	—
3903	—	2.7	2.7	2.6	2.6	—	—	—	—	—
3905	—	7.4	7.3	7.2	7.1	—	—	—	—	—
3907	—	13.3	13.2	12.9	12.8	—	—	—	—	—
3909	—	20.6	20.4	20.0	19.8	—	—	—	—	—
3911	—	29.2	29.1	28.6	28.1	—	—	—	—	—
4001	—	—	—	—	68	59	54	53	—	—
4003	—	—	—	—	143	124	113	112	—	—
4101	—	1.1	1.1	1.1	—	—	—	0.8	0.7	0.5
4103	—	2.3	2.3	2.3	—	—	—	1.7	1.5	1.0
4105	—	4.5	4.5	4.5	—	—	—	3.4	2.9	2.1
4201	—	—	—	—	9.8	8.5	—	—	—	—
4203	—	—	—	—	13.6	11.8	—	—	—	—
4205	—	—	—	—	18.5	16.2	—	—	—	—
4301	—	—	—	—	3.5	3.1	—	—	—	—
4303	—	—	—	—	9.8	8.5	—	—	—	—
4305	—	—	—	—	15.5	13.5	—	—	—	—
4307	—	—	—	—	26.0	22.5	—	—	—	—
4309	—	—	—	—	40.0	35.0	—	—	—	—
4311	—	—	—	—	55.0	47.5	—	—	—	—
4313	—	—	—	—	74.0	64.0	—	—	—	—
4401	—	—	—	—	4.3	3.8	—	—	—	—
4403	—	—	—	—	7.0	6.1	—	—	—	—
4405	—	—	—	—	12.5	11.0	—	—	—	—
4407	—	—	—	—	21.5	19.0	—	—	—	—

SPECIAL TIPS AND OTHER SINTERED CARBIDE PRODUCTS

In addition to Standard Carbide tips, the enterprises of the Union State Carbide Trust produce special tips of various shapes for diverse special and shaped tools.

Sintered carbides are remarkable for their hardness, wear- and corrosion resistance, stability at high temperatures and great compressive strength.

Owing to these outstanding properties sintered carbides are now extensively used in such branches of machine building industry where the machines operate under unfavourable conditions, i. e. where the machine parts are exposed to high temperatures and are subject to great abrasion and compression.

All parts made of sintered carbides receive high resistance for operation under heavy conditions and application of such parts ensures to the plants great economy and minimizes the idle time of machines, caused by replacement of machine parts.

Our plants successfully produce special tools and parts for various branches of industry, particularly for the watch, automobile, tractor and textile industries.

When ordering shaped tips or other special parts made of carbides, drawings of the required parts must be submitted.

The numerous remarkable properties of the carbides offer great opportunities to engineers and rationalization experts who are endeavouring to improve the designs of the machines and devices and to increase their efficiency and stability.

SINTERED CARBIDES USED IN OTHER BRANCHES OF INDUSTRY

Carbide products for other branches of Industry can be supplied both as standard products and as shaped and special products, manufactured in accordance with the drawings submitted by the customers.

DIE BLANKS

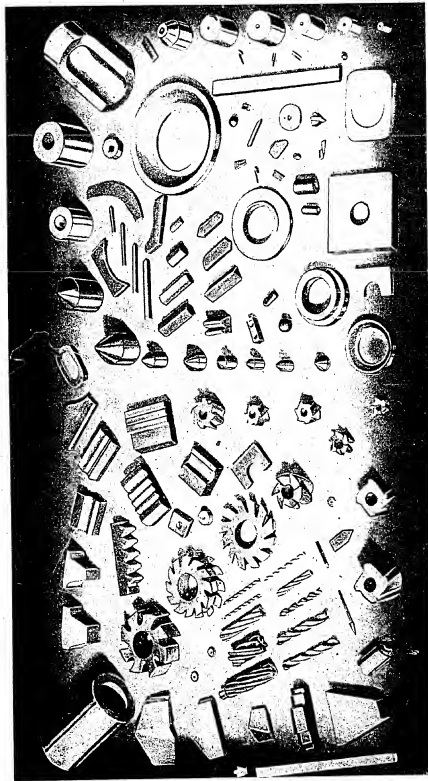
Carbide blanks intended for drawing and calibration of round and shaped metal bars and for upsetting bolts, screws and rivets are made of carbide grades mostly suitable for these purposes.

Standard blanks are manufactured in wide range according to the State Standards 3919-47, 2330-49, 5426-50, 6230-52 and 6231-52. Shapes and sizes of carbide products for metal drawing and calibration as well as the necessary instructions are given in our catalogue No. 10 "Hard alloys for metal drawing".

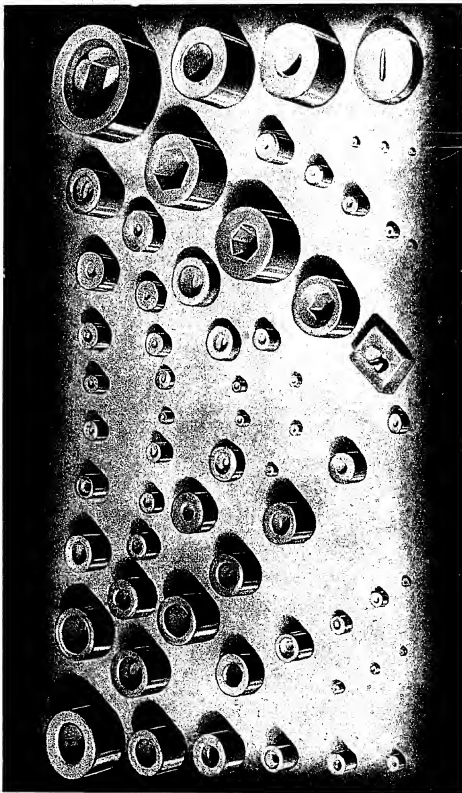
PRODUCTS FOR THE MINING INDUSTRY

Tips for tipping percussion rock bits, electrical and pneumatic drills for coal boring and rock drilling, coal cutter picks and bits of coal combines as well as for tipping of chisels of oil well drilling are made of Sintered Carbides grades having high hardness, wear-resistance and ability to resist against heavy impacts.

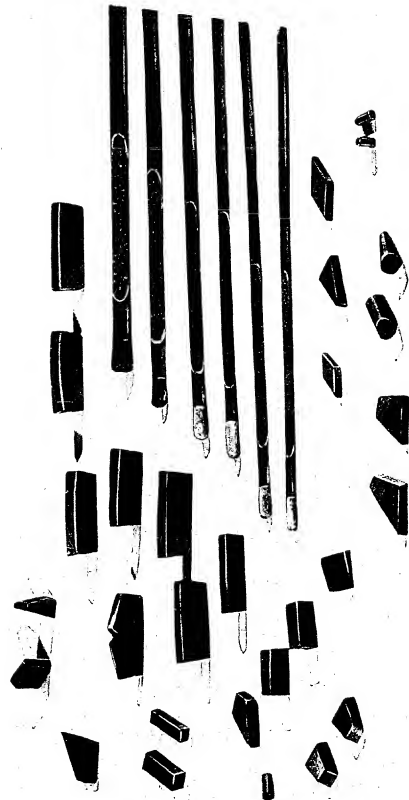
Shapes and sizes of carbide products for the mining industry according to the State Standard 880-53 and the necessary instructions are given in our catalogue No. 11.



These carbide products, as well as other shaped products are produced in accordance with the drawings of the customer.



Blanks of Carbide Drawing Dies are produced in a wide range in accordance with the State Standards and buyer's drawings.



Carbide Blanks for tipping rock-boring bits, and tube hard-facing alloy "Reit-T3" for hard-facing of oil-boring tools.

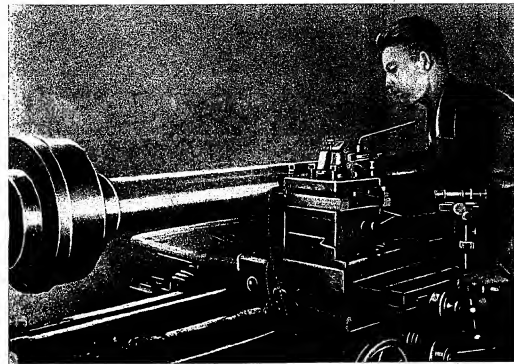
TUBE HARD-FACING ALLOYS FOR BORING TOOLS

Tube Hard-facing alloys "Relit T3" are manufactured of special grades of cast alloys and are supplied in particles of different sizes.

Hard-facing alloys "Relit" are intended for facing of oil boring chisels (reed-rollers, fish-tails, etc.).

Grades of Tube Hard-Facing alloys and instruction of chisel tipping are given in our Catalogue No. 11.

INSTRUCTIONS



HOW TO MAKE CARBIDE TIPPED TOOLS

The process of manufacture of carbide tipped tools is divided in three stages:

Stage I.

Manufacturing of steel shank.

Stage II.

Preparation of both shank and carbide tip for brazing.

Stage III.

Brazing carbide tip to the steel shank.

To obtain good results with the carbide tipped cutting tool correct performance of the above operations is essential. It is recommended to make shanks of carbon tool steel or alloy steel in dependance of tool design and conditions of its application.

For making shanks of rough turning and facing tools it is suggested to use carbon steel grade 45 & 50 having tensile strength 65—75 kg/mm².

For shanks of light duty design (parting, slotting, boring etc.) it is recommended to use steel grade 40X or 45X with subsequent heat treatment till hardness $H_{Rc}=40-45$.

For shanks subjected to low loads (thread cutting and finish turning tools) it is admitted to use steel grades 35 or 40.

The sizes of the shanks are to be chosen depending on the dimensions of the equipment and conditions of operation.

It is recommended to use the most great sizes of tools admitted by the machine-tool.

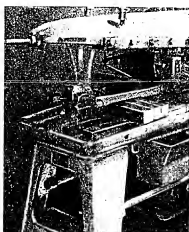
Length of the shank depends on the method of tool fastening and the work to be done.

Length of the shank for carbide tipped tools is same for tools tipped with high speed steel.

See below the main recommendations for manufacturing carbide tipped tools.

STAGE I — FORMING OF SHANK.

1. Preparation of material for shank.



A cold-drawn steel bar of the desired section is cut into blanks having length provided by the drawing. The cutting of the bar is most effectively performed by means of a press shearing machine.

This operation can be also accomplished:

- a) with circular metal cutting saws;
- b) with hacksaw machines;
- c) with horizontal milling machines;
- d) by forging method.

2. Forging of the shank.



Forging of the shank end is accomplished either by means of forging dies or by hand forging using gauges and special devices. The forging in dies is the most effective of the two procedures as the front and side reliefs of the tool are formed simultaneously with the tool end, which greatly reduces subsequent machining.

3. Tempering after forging.

To facilitate machining the forged shanks should be annealed.

Shanks made of steels grade 45 or 50 are tempered at the temperature of 800°—850° and made of chromium steels grade 40X or 45X at the temperature of 840°—870°.

4. Machining of the shank base surface.

This operation is necessary for proper set-up of the tool in the tool block of the machine and to obtain a base for subsequent machining of the shank grinding and lapping as well as for checking of the tool angles.

The best results are obtained with powerful surface-grinding machine having a magnetic chuck to which the shanks are rigidly clamped.



During this operation several shanks of identical shapes and sizes are machined simultaneously.

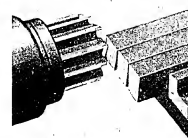
This operation can also be carried out:

- a) On vertical milling machines by means of a face milling head.
- b) On horizontal milling machines by means of plain milling cutters with bevelled teeth.
- c) On shapers by means of cutters.

5. Machining of the end and side of shank.

This operation consists in machining the end and side of the shank to obtain the required side and front reliefs.

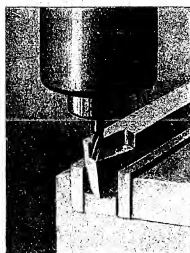
Machining is most effectively accomplished on the milling machines with the aid of special multipoint swivelling devices which permit to machine several shanks simultaneously.



This operation can also be performed:

- a) on horizontal milling machine with angular cutter. In this case the setting of the tool for obtaining the required angles is accomplished by using special wedge type shims or an adjustable vice.
- b) On vertical milling machine, using an adjustable milling head or a wedge type shim.

6. Machining the tip seat.



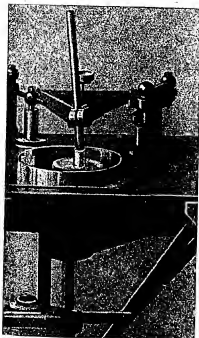
Tip seats of the open type are most effectively machined on milling machines with the use of a swivelling multipoint fixture.

Tip seats of semi-closed type should be machined on vertical milling machines by means of an end mill, using a swivelling device.

Tip seats of closed type (cut-in) are produced by means of a side mill. The bearing surface of the tip seat should be neither convex nor concave, and should be free of burrs.

STAGE II. PREPARATION OF TIP FOR BRAZING.

1. Grinding of the tip bearing surfaces.



Grinding of the tip bearing surface is not necessary unless there is some warping of the surface which prevents a close fit of the tip to the tip-seat.

Most effective is the chemical-mechanical method based on combined principle of destruction of the surface tip layer (fusing the cobalt bound) under the chemical action of copper vitriol solution with process of grinding (removing fused surface layer).

The chemical-mechanical process of grinding is carried out on a special machine, by rotation of two discs (upper and lower) as it is shown on the plan.

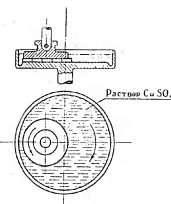
Sticking of the tips to the upper disc is

made by glue, the latter consists of wax (one share) and rosin (three shares).

For chemical-mechanical grinding is supplied suspension of the following composition:

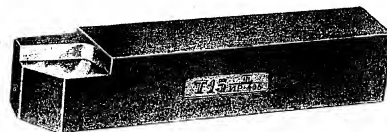
water — 1 l.
copper vitriol (sulphuric copper)—0.25 kg.
abrasive powder (corundum, emery) grain 120—170 — 1 kg.

When grinding each tip separately it is possible to clean the tips by green silicon carbide wheels.



2. Tool marking.

Tool marking is produced on left side of the shank by stamp or electric etching.



It is admitted to point the tool shank face, depending on grade of sintered carbides, on the following colours:

Hard alloy grade	Marking colour	Hard alloy grade	Marking colour
BK2	Black with white streak	T14K8	Grey
BK3	Black	T15K6	Green
BK6	Dark blue	T15K6T	Brown
BK8	Red	T30K4	Blue
T5K10	Yellow	T60K6	Blue with white streak

STAGE III. TIP BRAZING

Proper performance of this operation is absolutely essential as otherwise the tips, due to the cracks generating during brazing, will break while the tool is in operation.

SOLDER

Solder applied for tip brazing should have melting point ~ 300° higher of that appearing during metal cutting, secure durability and plasticity, possess well fluidity and provide rapid transference of heat from carbide tip to the shank.

Following Solders are recommended:

Solder	Composition	Melting point	Application
Copper-nickel	Copper — 68.7% Nickel — 27.5% Alumin. — 0.8% Zinc — 3.0%	1170°	For heavy duty operations with heating the tool cutting part up to 900°
Electrolitic copper	Copper — 99.9% impurity — 0.1%	1083°	
Brass-Nickel	Copper — 68.0% Zinc — 27.0% Nickel — 5.0%	1000°	Ditto but heating up to 700°
Brass L-62	Copper — 62.0% Zinc — 38.0%	900°	For light duty operations and with heating the tool cutting part up to 600°
Silver PCR-45 (OST-2982)	Silver — 10% Copper — 53% Zinc — 37%	720°	For brazing tips of grades T60K6 and T30K4

FLUX

To protect the carbide tip and the shank tip seat from oxidation and to facilitate the removal of oxides as well as for better brazing of the tip to the shank it is necessary to use flux during brazing process.

Borax is the best flux material. Prior to use it must be melted, crushed and screened through a fine screen. Borax should be kept in closed receptacles to protect it from dirt and mixture.

Borax is applied either in powder or on paste, consisting of three shares of borax and two shares of vaseline.

When brazing carbide tips with brass solder it is recommended to use flux consisting of 50% borax and 50% of boric acid. Melting point of this flux is 750°.

When using silver solder should be applied flux consisting of 43% fluorine calcium and 57% of boric acid.

GAUZE CUSHION

To reduce thermal stress when brazing thin and long tips as well as large tips intended for heavy duty work it is recommended to insert Gauzes between the shank and tip. These gauzes are made of carbon steel or permalloy.

It is necessary to use gauzes especially when brazing tips of high titanium content.

Gauzes are manufactured of tinfoil or steel wire-net having thickness of 0.2—0.5 mm with holes 1—2 mm dia.

Gauze Cushions increase the toughness of brazing and prevent carbide tips from cracking which may occur during cooling of the brazed tools.

BRAZING METHODS

Heating of shanks and tips and melting of solder can be performed in the following manner:

- in a gas or oil fired furnace or in an electric muffle furnace;
- by high frequency currents;
- by contact method in an electric arc welding machine;
- by oxyacetylene torch.

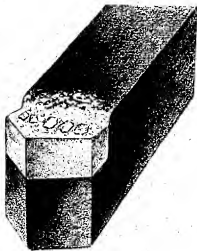
To facilitate the tensions which arise in hard alloys during cooling, it is recommended to braze Sintered Carbides T60K6 and T30K4, especially inclined to chilling cracks, only along one side; the tip side surfaces are to be protected from brazing by graphite or micaceous washers.

BRAZING IN GAS, OIL-FIRED OR ELECTRIC FURNACES

1. Shank preheating

Shank recess should be thoroughly preheated up to a temperature of 800° which is the melting point of borax.

2. Preparation of tool for brazing



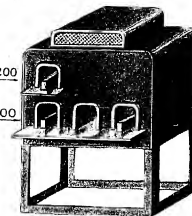
The preheated tip seat is sprinkled with borax and the shank is removed from the furnace and brushed clean from scale with a wire brush.

The tip seat is then again coated with strip of copper cut to size laid on top of the tip, whereupon the whole is sprinkled with borax in such a way as to cover the solder and the entire tip with a solid layer of borax.

This operation must be done quickly to prevent the cooling of the shank.

3. Solder melting

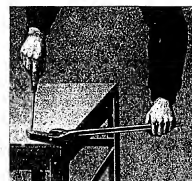
The end of the shank prepared for brazing is placed in the furnace muffle at the temperature of 1200° and is kept there until the solder has melted.



4. Pressing the tip to the shank

As soon as the solder has melted and flows under the tip, the tool is quickly removed from the furnace and placed on a special stand; the tip is then firmly pressed in correct position with a pointed rod.

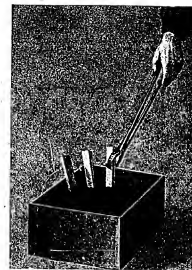
Pressure is applied for a few seconds until the braze hardens and a firm joint has developed.



5. Tool cooling

In order to avoid quick cooling which may cause cracking of the tip, the heated tool should be placed into a box filled with pulverized charcoal or with dry warmed sand for slow cooling.

More better to place the tools immediately after brazing in a chamber furnace heated up to 250°. Tools should be kept there within 5-6 hours, afterwards they should be cooled together with the furnace.



6. Tool cleaning

After cooling the tool is cleaned from scale in a sand blast machine.

HIGH FREQUENCY INDUCTION BRAZING

This method is most efficient, convenient and economical and ensures high quality of brazing.

Any available equipment for producing high frequency currents may be used for this purpose.

Heating of the shank and tip as well as melting of the solder are accomplished in an inductor, the shape of which must be similar to the shape of the tool end.

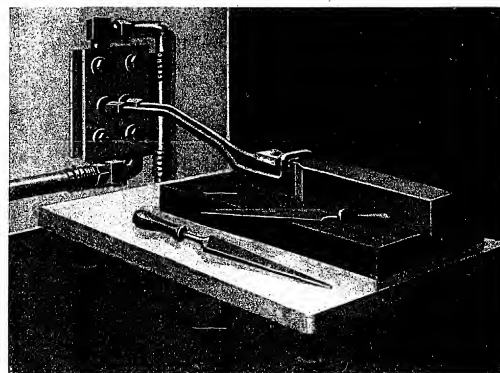
The size of the working space of the inductor must be at 20—30 mm more than the shank size.

Brazing procedure

1. The tip seat is sprinkled with a pulverized mixture of solder and flux; the tip coated with the same mixture is then placed in the tip seat.

2. The tool so prepared for brazing is placed in the inductor where the tool end is heated to a temperature corresponding to the melting point of solder.

3. When the solder has melted, the tool is removed from the inductor, the tip is pressed into the tip seat with a metallic pointed rod and the whole is placed into a box filled with pulverized charcoal or with dry warmed sand for slow cooling.



High frequency tip brazing

BRAZING BY CONTACT METHOD IN ELECTRIC WELDING MACHINES

The contact brazing is performed in electric welding machines which are equipped with a simple device, consisting of two flat contact carriers, a set of contact bars, a block with a load and a push button.

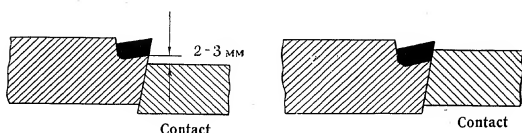
Contact brazing is similar to furnace brazing and is performed in the following way:

1. The shank is firmly held in the contact carriers and is so positioned as to produce the greatest possible contact surface between the face of the shank and the contact bar.

2. The contact bar is put close to the shank and then pressed to it.

3. The tip seat is sprinkled with borax and the end of the tool is then preheated to about 800° (the melting point of borax) by alternatively switching on and off the electric current. When borax has melted, the tip seat is cleaned from scale and oxides with a wire brush and then again coated with borax.

The carbide tip is placed in the tip seat, solder is laid on top of it and the whole is again liberally sprinkled with borax.



"Correct". The contact point does not touch the carbide tip.

"Wrong". The contact point touches the carbide tip.

4. The current is switched on for melting the solder, then it is switched off again and the tip is pressed into the tip seat with a metallic pointed rod.

5. The tool is removed from the contact clamps and placed into a box filled with pulverized charcoal or with dry warmed sand for slow cooling.

6. After cooling the tool is cleaned from scale in a sand-blast machine.

TORCH BRAZING

When this method is applied, an oxyacetylene torch serves as the source of heat. It should be noted that this method is used

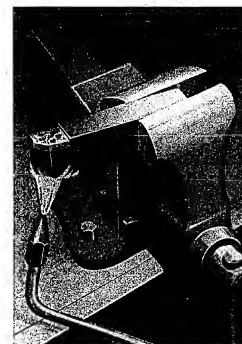
only when other heat sources like those described above are not available or when only a relatively small number of tools is to be brazed.

A torch with a non-oxidizing flame must be used (with surplus of acetylene), the flame being directed at the shank, from which the tip gets its heat.

The brazing process is identical to that used when brazing in furnaces. Torch brazing must be performed by a skilled operator having great experience in this kind of work.

All methods of brazing must produce a thin solid joint firmly connecting the contact surfaces of tip and recess.

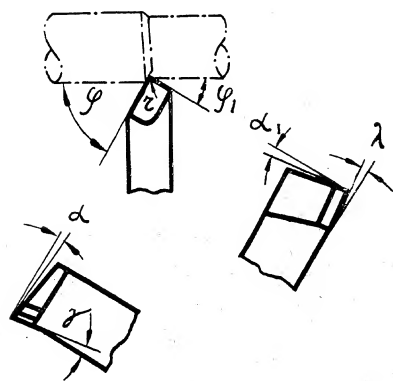
The tip should not be displaced in the tip seat.



Carbide tip brazing by means of an oxyacetylene torch.

GEOMETRY AND SHAPE OF TIPPED TOOL

I. SYMBOLS OF TOOL GEOMETRY



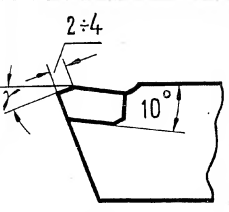
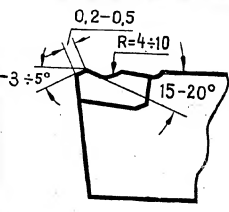
- α — Clearance angle
- α_1 — Side relief angle
- γ — Rake angle
- λ — Front clearance angle
- ϕ — Cutting edge angle
- ϕ_1 — End cutting edge angle
- r — Relief surfaces conjugate radius

II. SELECTION OF TOP SURFACE SHAPE

Depending upon the tool type, material to be machined and conditions of operation the following main tool Shapes are recommended.

Top surface shape	Applications
<p>Flat with positive rake angle</p>	<p>Machining of non-ferrous metals and alloys</p>
<p>Flat with positive rake angle and negative chamfer</p>	<p>Machining of gray and malleable cast iron; Machining of steel $\sigma_B \leq 100 \text{ kg/mm}^2$ Machining of steel $\sigma_B > 100 \text{ kg/mm}^2$ when durability of the system "machine-tool-part-instrument" is insufficient When machining steel it is necessary to use chipbreakers.</p>

Continuation

Top surface shape	Applications
 <p>Flat with negative rake angle</p>	<p>Machining of cast iron $H_b > 300$ Machining of steel $\sigma_B > 100$ kg/mm²</p> <p>Machining of scale surfaces with interrupted cuts, and with varying depth of cut.</p> <p>When machining steel it is necessary to use chipbreakers or to combine angles φ and λ so that to secure chip breaking</p>
 <p>Radius form</p>	<p>Machining of soft steels.</p> <p>Radius groove with depth 0.1—0.3 mm is done by means of electro-erosion method</p>

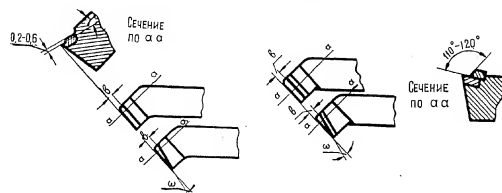
III. CHIP CONTROL

Chip control is necessary when machining steel with very rapid speeds.

Radius form of rake angle, shown above, secures safe removal and breaking of the chip.

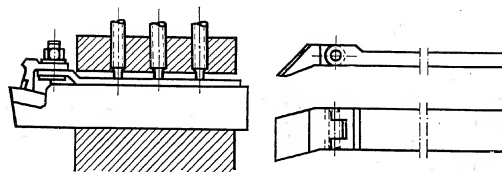
When using flat form of rake angle chip curling and breaking are secured by:

- Chip breaking rebates grinded along the cutting edge of the tool or under small angle.
- Brazed tips—chipbreakers.
- Plated chipbreakers of various design.



Chip breaking groove.

Chipbreaker brazed to the tool



Mechanic chipbreaker

Basic dimensions of chip breaking rebates and brazed chipbreakers.

Depth of cut	Feed mm/per rev.	Size "a" mm	ω°
to 4	0.2—0.7	1.5—6	20
4—8	0.2—1.0	3 —8	15
8—15	0.4—2.0	4 —10	10

IV. RECOMMENDED GEOMETRIC SIZES

When machining steel with ultimate strength up to 100 kg/mm² and cast iron with Brinell hardness up to 300 it is recommended to use positive rake angles.

Negative rake angles should be used only in case when necessary maximum possible increase of utilization toughness of tool cutting part.

Smooth operation with negative rake angles can be secured only when the required rigidity of the system "machine-tool-part-instrument" is available.

SELECTION OF CLEARANCE ANGLES

Clearance angle α must be selected in the following ranges:

Tool Type	Clearance angle α°	
	Steel machining	Cast iron machining
Turning and turret lathe tools of all types	8 + 12	6 + 10
Boring tools	10 + 14	10 + 14
Planer tools of all types	6 + 8	4 + 6

Smaller value of angles are recommended for feeds >0.3 mm/per revol.

Larger value of angles are recommended for feeds ≤ 0.3 mm/per revol.

The side relief angle α_1 is taken equal to clearance angle α for all types of tool except parting and slitting tools having $\alpha_1 = 1-2^\circ$.

SELECTION OF RAKE ANGLE

Rake angle γ depending on material to be cut and type of machining is recommended to select in the following range:

Material to be machined	Rake angle
Steel σ_B up to 80 kg/mm ²	from 16 to 10
" σ_B up to 80-100 kg/mm ²	" 12 to 6
" σ_B above 100 kg/mm ²	" 6 to -5
Cast iron H_B to 200	" 12 to 8
" " H_B 200-300	" 8 to 4
" " H_B above 300	" 0 to -6
Copper	" 25 to 20
Bronze and brass	" 12 to 6
Pure aluminium	" 35 to 25
Tough aluminium alloys	" 14 to 10
Aluminium alloys containing silicon	" 10 to 6
Magnesium alloys	" 12 to 8

SELECTION OF CUTTING EDGE ANGLE

Cutting edge angle ϕ must be selected within $30-45^\circ$. In case the system "machine-tool-part-instrument" possess insufficient rigidity the cutting edge angle ϕ must be taken within $60-90^\circ$.

SELECTION OF THE INCLINE OF CUTTING EDGE

Positive angle incline of the cutting edge λ is recommended within $10-15^\circ$ for shaping tools as well as for turning tools with interrupted cutting.

For all other conditions of operations the incline angle of cutting edge of turning tools is recommended to take equal 0° .

CARBIDE TOOL LIFE DEPENDS ON THE PROPER TOOL SHARPENING

Life of the tools and consequently their efficiency depends on the quality of sharpening.

High sensitivity of sintered carbides to impacts and temperature influence requires great care in the process of sharpening.

According to the increase in difficulties of sharpening (to obtain keen and smooth cutting edges) the Grades of Sintered Carbides may be put into the following order:

BK15, BK11, BK10, BK8, T5K10, T14K8, BK6, T15K6, T15K6T, BK3, T30K4 and T60K6.

Well sharpened tipped tools can be obtained:

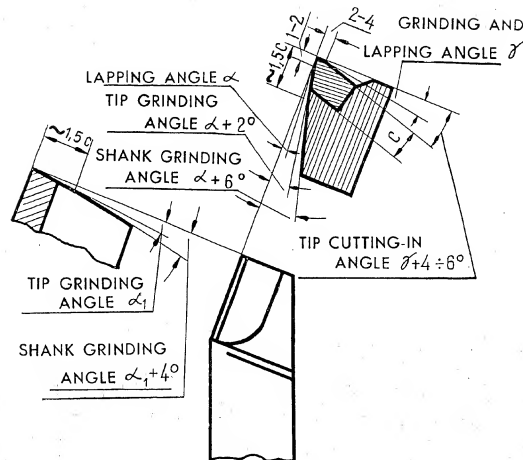
- 1) when the suitable grinding wheel is used,
- 2) when the basic rules of tool grinding is strictly observed,
- 3) the grinding machine is kept in good conditions and the operator is a high skilled worker.

RULES OF GRINDING AND LAPPING CARBIDE TOOLS

To get proper tool angles, reduce time for grinding and lapping and to obtain economy in Carbides, and abrasive materials it is recommended:

- a) for the top surface—principle of double angles;

- b) for clearance angle—principle of triple angles;
- c) for side relief angle—principle of double angles.

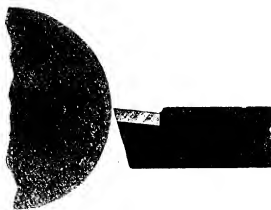


BASIC RECOMMENDATIONS FOR GRINDING

1. The grinding of tipped tools should be performed by specially trained operators.
2. Grinding the tools can be performed on grinding machines of any design by hand, without rigid clamping the tool to be grinded.

3. The design of the grinding machine should be rigid. The spindle must be free from vibrations and play.

4. For grinding the tool should be set on the grinding machine at the desired angles, using an adjustable table rest. In order to avoid seizure by grinding wheel, the rest table should be set as possible nearer to the wheel and the tool cutting edge should not be lower the wheel centre line.



5. The wheel should be rotating downwards to the cutting edge.

6. While grinding it is necessary to use coolant (a 3—5 per cent emulsol solution) which must be supplied continuously at the rate of not less than 6 litres per minute. This will increase output of grinding by 50%.

Under no circumstances should the coolant be supplied drop-wise or in the form of spray as it may cause cracks in the tips. When the tool is grinded dry cooling in water is prohibited.

7. Tools grinding should be done by slightly pressing the tool against the wheel, and at the same time keeping the tool continuously moving across the wheel. Excessive pressure on the wheel will not increase the grinding but will lead to tip cracking and increase expenditure of grinding wheels.

8. Grind the tools only with well dressed wheel otherwise it will cause cracks in the tips.

The grinding wheels should be dressed periodically.

9. The sharpening of tipped tools is performed in the following manner:

- a) Rough grinding of tool shank along back surfaces by silicon carbide wheel grain 46—60, bond hardness C1-CM1 at a surface speed of 25 m/per second.
- b) Rough grinding of carbides grades BK15, BK11, BK10, BK8, BK6, T5K10, T14K8 & T15K6 with green silicon carbide wheels of 60—46 grain, soft bond M3-CM2.
- c) Finish grinding of same carbide grades with green silicon carbide wheels of 80—60 grain, bond hardness M2-M3.
- d) Preliminary grinding of carbides grades BK2, BK3, T15K6T, T30K4 and T60K6—with green silicon carbide wheels of 60 grain and hardness M2-CM1.
- e) Fine grinding for same carbide grades with green silicon carbide wheels of grain 80—100 and hardness M1-M2.

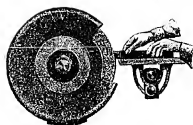
10. For rough and finish grinding a surface speed of the wheel ranging from 12 to 18 m' per second is recommended.

GRINDING PROCEDURE

The technological process of the tipped tool grinding consists of the three following operations:

- I. Grinding of shank side secondary reliefs,
- II. Rough tip grinding,
- III. Finish tip grinding.

I. Grinding of shank side secondary relief:



- a) Roughing of the side secondary relief at an angle $\alpha + 6^\circ$;
- b) Roughing of the front secondary relief at an angle $\alpha_1 + 4^\circ$.

II. Rough tip grinding



- a) Side relief grinding at the angle of $\alpha + 2^\circ$;
- b) Front relief grinding at the angle of α_1 ;



- c) Top face grinding at the angle of γ .

III. Finish tip grinding



- a) Top face grinding at the angle of γ ;

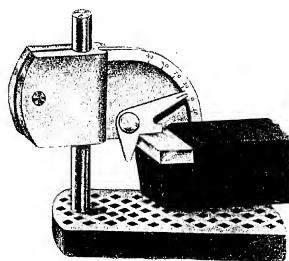


- b) Side relief grinding at the angle of $\alpha + 2^\circ$;
- c) Front relief grinding at the angle of α_1 ;

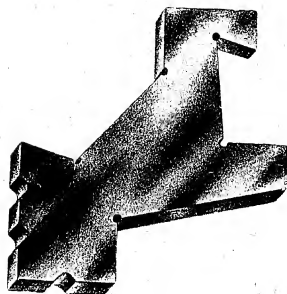


- d) Tool nose radius grinding at the angle of $\alpha + 2^\circ$.

It is recommended to do rough grinding with the periphery of a straight wheel, and finish grinding with the face of a cup type wheel. After grinding, cutting edges should have neither roundings nor nicks. Cutting edges should be keen and rectilinear. The angles are to be checked with templates or with universal protractors.

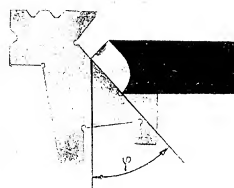


Universal Bevel Protractor

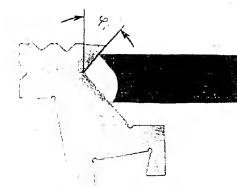


Template for checking tool angles

EXAMPLES OF TEMPLATE APPLICATIONS FOR CHECKING TOOL ANGLES



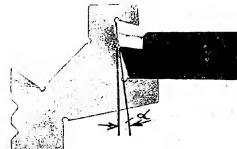
Checking of cutting-edge angles



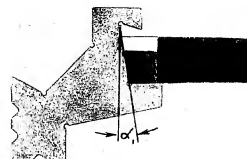
Checking of the end cutting edge angle



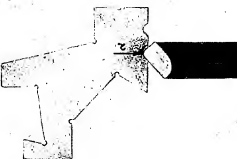
Checking of the true rake angle



Checking of clearance angle



Checking of the side relief angle



Checking of the nose radius

LAPPING INCREASES TOOL LIFE TWOFOLD

Lapping of carbide tipped tools is aimed to remove from tool cutting edges different irregularities and jags appearing during grinding.

To obtain a more accurate finish and a keener cutting edge the tool must be lapped after grinding.

Tool lapping is performed on special lapping machines. These machines are of simple design and they can be produced by any metalworking plant.

The lapping disc is made of cast iron of $H_n=120-160$ hardness.

The lapping machine should have a rigid construction (to avoid vibrations).

COMPOSITION OF PASTES FOR CARBIDE TIP LAPPING

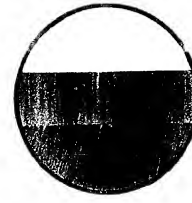
Paste No.	Paste characteristic	Composition mass per cent in weight			Coefficient of productivity	Application
		Boron carbide	Silicon carbide green	Paral. fine		
1	High productivity	85	—	15	1,0	For tools of all kinds
2	Middle productivity	70	—	30	0,8	ditto
3	Reduced productivity	25	55	20	0,7	"
4	Low productivity	—	80	20	0,6	"

The run-out of the disc face surface must not exceed 0.05 mm. The disc must have peripheral speed from 1 to 1.5 m/sec.

The table rests of the machine should be swivelling and provided with special devices—protractors allowing to adjust tools at the required angles during lapping.



Tool cutting edge after grinding



Tool cutting edge after lapping

Suggested grit of lapping material:

- a) for rough tools—Nos. 325—270,
- b) for finish tools—M28-M20,
- c) for tools intended for extra precise operations M10-M14.

Paste coating should be applied while the disc is rotating; prior to this the working surface of the disc should be dipped in kerosene.

The disc should rotate in the opposite direction to the grinding wheel: it should "run-away" from the tool cutting edge, as otherwise the cutting edge will scratch the paste off the disc and will damage it, while no lapping will ensue.

The tool should be smoothly moved towards the lapping disc and slightly pressed against it.

Hard pressure while not accelerating the lapping operation increases the consumption of lapping materials. When lapping, the tool should be kept moving across the disc to the right and to the left.

The lapping process applied to the tipped tool is the same as the grinding process and consists of the following three operations:

- 1) lapping the side of tool;
- 2) lapping the top surface;
- 3) lapping of the nose radius.

After lapping, the cutting edges of the tipped tool must be keen, free of jags and must have no scratches left by the grinding wheels. The curve of the nose radius must be even and smooth.

After lapping the side and top surfaces must be slightly dulled by a fine green silicon carbide stone.

HOW TO SELECT PROPER SPEED, FEED AND DEPTH OF CUT

When selecting speed, feed and the depth of cut it is necessary to take into account the grade of carbide, the material to be machined as well as the capacity of the machine tool and the period of tool resistance.

I. DEFINITION OF DEPTH OF CUT

The depth of cut is determined by the allowance provided for machining. Rough and semi-finish machining it is recommended to perform in one pass, leaving only a small allowance for subsequent finish operations.

II. FEED SELECTION

To obtain minimum possible cutting time it is necessary to use the maximum feeds permissible.

Average feeds recommended for rough machining of soft steels, steel casting and cast-iron are given below.

Diameter of the part to be machined	Depth of cut, mm		
	Up to 5	Above 5 up to 10	Above 10 up to 15
Rate of feed, mm/per rev.			
to 30	0,2—0,5	—	—
„ 50	0,4—0,8	—	—
„ 80	0,6—1,2	0,5—1,0	—
„ 120	1,0—1,6	0,7—1,3	—
„ 180	1,4—2,0	1,1—1,8	0,8—1,5
„ 260	1,8—2,6	1,5—2,0	1,1—2,0

For finish turning, the feed is selected depending on the required smoothness of the surface to be machined.

III. SELECTING OF CUTTING SPEED

The cutting speeds recommended for several materials widely used in industry (external turning) without cooling are given in the table below.

Under normal conditions the cutting speeds shown on the table will secure tool resistance of about 60 min. of cutting time.

Material to be machined	Carbide grade	Depth of cut in mm	Feed mm/rev. revol.	Cutting speed m/min.	
Carbon Steels	$\sigma_b = 65 \text{ kg/mm}^2$	T5K10	4—15	0.5—2.0	105— 50
		T14K8	3—10	0.3—1.6	150— 70
		T15K6	1— 8	0.2—1.4	315—120
		T15K6T	1— 8	0.2—1.4	380—140
		T30K4	1— 4	0.1—0.3	500—320
Carbon-alloy steels constructional steels	$\sigma_b = 75 \text{ kg/mm}^2$	T5K10	4—15	0.5—2.0	85— 40
		T14K8	3—10	0.3—1.6	120— 55
		T15K6	1— 8	0.2—1.4	250— 95
		T15K6T	1— 8	0.2—1.4	300—115
		T30K4	1— 4	0.1—0.3	400—255
	$\sigma_b = 85 \text{ kg/mm}^2$	T5K10	4—15	0.5—2.0	70— 35
		T14K8	3—10	0.3—1.6	105— 50
		T15K6	1— 8	0.2—1.4	210— 80
		T15K6T	1— 8	0.2—1.4	255— 95
		T30K4	1— 4	0.1—0.3	340—215
$\sigma_b = 100 \text{ kg/mm}^2$		T5K10	4—15	0.5—2.0	55— 25
		T14K8	3—10	0.3—1.6	80— 35
		T15K6	1— 8	0.2—1.4	165— 65
		T15K6T	1— 8	0.2—1.4	200— 75
		T30K4	1— 4	0.1—0.3	265—170

Continuation

Material to be machined		Carbide grade	Depth of cut in mm	Feed mm/per revol.	Cutting speed m/min.
Hardened steel	$\sigma_b=125 \text{ kg/mm}^2$	T5K10	0.2—2.0	0.05—0.3	140—45
		T15K6	0.2—2.0	0.05—0.3	200—70
	$\sigma_b=145 \text{ kg/mm}^2$	T5K10	0.2—2.0	0.05—0.3	100—35
		T15K6	0.2—2.0	0.05—0.3	150—50
	$\sigma_b=165 \text{ kg/mm}^2$	T5K10	0.2—2.0	0.05—0.3	85—25
		T15K6	0.2—2.0	0.05—0.3	120—40
Machining may be also performed by sintered carbides grades BK8, BK2 & T30K4					
Gray cast iron	$H_B=170$	BK8	4—15	0.5—3.0	90—35
		BK6	2—8	0.3—2.0	140—55
		BK2	1—8	0.1—1.0	220—80
		BK3	1—3	0.1—0.3	220—155
	$H_B=190$	BK8	4—15	0.5—3.0	75—30
		BK6	2—8	0.3—2.0	115—45
		BK2	1—8	0.1—1.0	185—70
		BK3	1—3	0.1—0.3	185—130
	$H_B=230$	BK8	4—15	0.5—3.0	55—20
		BK6	2—8	0.3—2.0	85—30
		BK2	1—8	0.1—1.0	130—50
		BK3	1—3	0.1—0.3	130—90
Copper	BK6	1—5	0.2—0.8	500—350	
Bronze	BK6	..	..	400—250	
	BK2	..	..	480—300	
Pure aluminium	BK6	..	..	1500—1000	
Tough aluminium alloys	BK6	..	..	400—250	
	BK2	..	..	480—300	
Aluminium alloys containing silicon	BK6	..	..	300—150	
	BK2	..	..	360—180	
Magnesium alloy	BK6	..	..	2000—1000	
	BK2	..	..	2400—1200	

BASIC RULES OF APPLICATION OF CARBIDE TIPPED TOOLS

To get the best results with the carbide tipped tools, the following basic rules must be observed:

I. MACHINE-TOOL

The machine-tool chosen to work with carbide tipped tools must meet the following requirements:

- a) It must be powerful enough to operate with the specified cutting speed, feed and depth of cut.
- b) Good condition of the machine-tool is absolutely essential. Spindle bearings and all carriage slides must be properly adjusted to eliminate end play and vibration.
- c) The feed gear must be strong enough to allow the use of the specified feeds.

II. COOLANT

The application of coolant when working with carbide tipped tools has a good effect on the cutting process as it increases the output and improves the quality of the machined surface.

The coolant should be directed at the tool point in an abundant and uninterrupted flow at the rate of not less than 12 l/per minute.

If however, the capacity of the coolant pump mounted on the machine is insufficient to provide for such a volume of coolant, it is preferable to work without coolant at all. Insufficient supply of coolant causes cracking of the carbide tips and consequently results in premature tool wear.



Insufficient or drop-wise cooling while grinding or while using the tool may cause tip cracking.

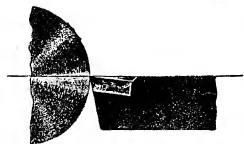
III. SETTING OF THE PART TO BE MACHINED

The parts to be machined should be rigidly clamped. If the part is machined in centers proper fixing of the tailstock and its spindle must be assured during the operation. When the part to be machined is held by a lathe chuck or face plate, it must be accurately set before final clamping to avoid eccentricity which may cause chipping and cracking of carbide tips due to uneven depth of cut.

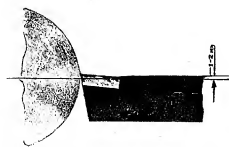
When working at high cutting speeds it is recommended to use a live center or a center provided with a carbide insert, as an ordinary center will wear out very quickly. When turning parts of a considerable length, a roller steady rest must be substituted for cam steady rest.

IV. TOOL SETTING AND CLAMPING

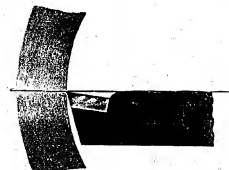
1. The setting of the tool in the tool holder is done in accordance with the material to be cut and the method of machining. The tool is set up:



When machining cast-iron, bronze and brass—EXACTLY ALONG THE CENTER LINE.



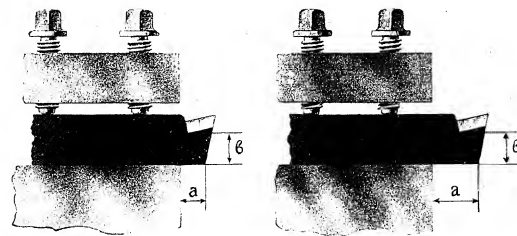
When machining Steel—1-2 MM ABOVE THE CENTER LINE.



When boring all kind of materials — EXACTLY ALONG THE CENTER LINE.

2. It is recommended to keep the tool overhang as small as possible, as a great tool overhang leads to vibrations which unfavourably affect the performance of the tool and cause tip chipping.

The tool overhang must not be greater than the height of the tool.



"Correct": "a" is equal or smaller than "b"

"Wrong": "a" is larger than "b"

V. HOW TO HANDLE THE TOOL WHILE IN USE

1. It is not permitted to withdraw the tool while the feed is engaged. It is also forbidden to stop or start the machine when the tool is under cutting conditions.
2. If the machine accidentally stops during the operation the spindle must not be reversed to relieve the tool, as it may cause tip chipping. In that case the clamping screws of the tool holder must be unscrewed beginning with the rear ones whereupon the tool can be easily removed.
3. When machining an eccentric part the tool must be gradually brought into contact with the work piece by hand. The power feed should not be engaged until the tool has reached the desired depth of cut.
4. The tool must not be fed to the work piece unless the latter is in motion.
5. If vibrations are manifested during the operation it should be immediately discontinued, and necessary steps taken to eliminate the trouble.

6. The tipped tool must be handled with care.

Any impact may easily damage it.

In storage, the carbide tool should be protected and its cutting edges should not be allowed to come into contact with other tools or metal parts.

VI. CHIP DISPOSAL

The high cutting speeds used when working with carbide tipped tools result in the production of a large amount of chips during the cutting operation. Steel machining produces a continuous chip which is dangerous to the operator. The chip may also wind itself round the work piece thus making further operation impossible.

Therefore when machining is performed with tipped cutting tools, especially where steel is concerned, it is necessary to apply special devices for breaking and coiling the chip. For that purpose we recommend to use various shapes of tool top face or chip-breakers as shown on page 91—93.

VII. CHANGING TOOLS FOR RESHARPENING

During the operation the cutting edges are continuously wearing out at the end and side of tool.

It is not recommended to work with a dull cutter as during further use it wears so rapidly that chipping of the carbide tip becomes inevitable.

In addition, when sharpening an excessively worn out tool a large stock of carbide has to be removed, what is not economical.

The tools should be sent to the grinding room for resharpening as soon as normal wear is manifested.

Resharpening and lapping of tools are to be carried out in accordance with rules mentioned on page 96—106.

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BK2 and T15K6T

SINTERED CARBIDE BK-2

is more efficient than grades BK8 and BK6 for all kind of cast iron machining with uninterrupted cutting than grades BK8 and BK6.

SINTERED CARBIDE T15K6T

is more productive than grade T15K6 for fine and semi-finish steel machining.

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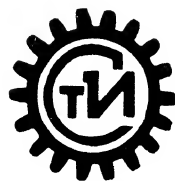
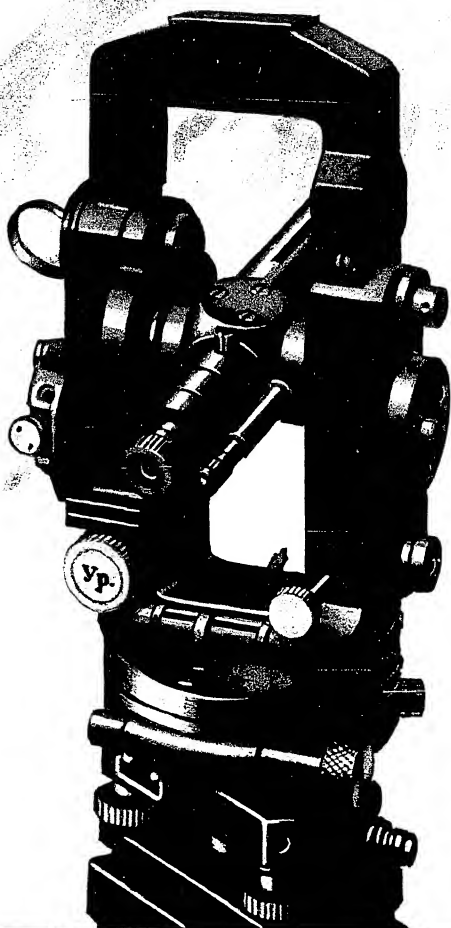
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GEODETIC

23



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Geodetic Instruments, produced in the U.S.S.R., are the result of many years of earnest study of the requirements of the engineering profession and the application of modern scientific methods in their manufacture.

The first class materials, perfect modern design and skillful workmanship provide accuracy and durability of the instruments.

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UNIVERSAL ASTRONOMICAL THEODOLITE, MODEL AY 2/10

The Universal Astronomical Theodolite (Fig. 1) is a high-precision astronomical geodetic instrument designed for astronomical observations and for measuring horizontal and vertical angles at points of first order triangulation. In first order triangulation, not only the astronomical latitudes and longitudes



Fig. 1

are determined for intermediate astronomical points but also their astronomical azimuth in reference to one of the adjoining trigonometric points. The astronomical azimuth, in conjunction with the astronomical longitude of the point whose azimuth has been determined, is of vital importance for controlling

measurements in triangulation. Readings on the horizontal circle are made with the aid of two micrometer microscopes with drum scale divisions of $2''$. The vertical circle is read by means of two vernier microscopes having scale divisions of $10''$.

The main telescope is of the astronomical, broken-line, central type comprising a two-lens objective, a rectangular prism and a rotary eyepiece micrometer with two interchangeable eyepieces.

The Universal Astronomical Theodolite consists of the following main parts:

- a) Base of instrument (lower part) carrying the horizontal circle and the alidade with the two micrometer microscopes.
- b) Main telescope (upper part) with the vertical circle, vernier microscopes and the Talcott spirit level.
- c) Striding spirit level.
- d) Auxiliary telescope.

The high-quality materials used in manufacturing of the instrument (bronze, brass) ensure its anticorrosive properties. The vital parts, such as the limb, base, lower movement and horizontal axis undergo a special heat treatment to ensure stability of dimensions, one of the most important factors effecting the accuracy of the instrument.

The design of the instrument provides for reliable stability in operation and high accuracy in measurements.

The instrument is stored in two cases.

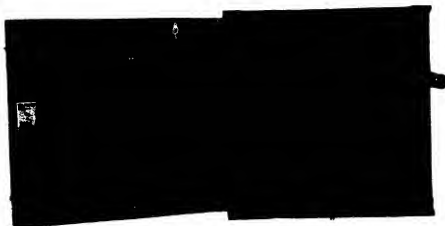


Fig. 2

The lower movement and base, striding spirit level, screw drivers, brush, studs, wrench and levelling shoes are stored in specially provided recesses of one case (Fig. 2).

4

СТАНКОИМПОРТ

The other case (Fig. 3) contains the main telescope (upper part of instrument), auxiliary telescope, blind, spare eyepiece, hand hammer and a special box with electrical accessories. All these items are fitted into specially provided recesses.

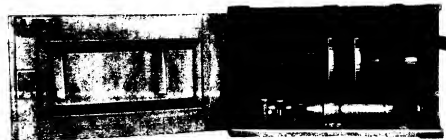


Fig. 3

SPECIFICATIONS

Main telescope

Aperture of objective	55 mm
Resolving power of objective	2.56"
Focal length of objective	450 mm $\pm 1\%$
Focal lengths of eyepieces	8 and 10 mm
Total magnification of telescope	56 \times and 45 \times
Diameters of exit apertures	1.0 and 1.2 mm
Field of view	0°54'
Telescope focusing range	from 5 m to infinity
Distances to exit apertures	1.4 and 2.76 mm
Spider cross-hairs comprising 9 stationary hairs with an angular interval	90" $\pm 5''$
and adjustable bisector and hairs; width of bisector	25" $\pm 30''$
Distance between bisector and parallel hair	115" $\pm 3''$
The drum of the eyepiece micrometer has 100 divisions	
Value of micrometer drum scale divisions	1.0"
Angle of rotation of eyepiece micrometer together with cross-hairs	up to 90°
The angle of rotation is set to a positioning circle having a sector scale of 90° with 1° divisions	
Maximum elevation of telescope with striding level	73°

Auxiliary telescope

Auxiliary telescope - astronomical, straight type comprising a two-lens objective and an eyepiece furnished with a micrometer	
Aperture of objective	36 mm
Resolving power of objective	4"
Focal length of objective	360 mm $\pm 1\%$
Focal length of eyepiece	12 mm
Total magnification of telescope	30 \times
Diameter of exit aperture	1.2 mm
Field of view	1°
Telescope focusing range	from 7 m to infinity
Distance to exit aperture	8.0 mm

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Spider cross-hairs consisting of three horizontal hairs at an angular interval..... $150'' \pm 10''$
 and adjustable vertical bisector with an angular distance $30'' - 35''$
 The eyepiece micrometer drum has 100 divisions
 Value of drum divisions $1.4''$

Reading micrometer microscopes for horizontal circle

Magnification of micrometer microscopes $49\times$
 Pitch of micrometer screws 0.25 mm
 Microscope field of view (visible portion of circle) 3.1 mm
 this corresponds to a limb reading of $1^\circ 37'$
 Value of drum scale divisions $2''$
 The drum has 60 divisions
 2.5 rotations of the screw correspond to a cross-hair bisector movement through 1 limb division
 The bisector consists of two pairs of spider cross-hairs
 Distance between axes of bisector $4' \pm 2''$
 Width of bisectors $53'' \pm 2''$
 The micrometer cases have engraved inscriptions:
 "A" and "5" for horizontal circle microscopes and "I" and "II" for vertical circle microscopes

Scale reading microscopes for vertical circle

Magnification of microscopes $28\times$
 Focal length of objective 29.96 mm
 Focal length of eyepiece 13.3 mm
 Microscope field of view (visible portion of circle) 4 mm
 this corresponds to a limb reading of $3^\circ 10'$
 Distance to exit aperture 6.3 mm
 The vernier scale of the microscopes has 30 divisions corresponding to 29 circle divisions

Horizontal and vertical circles

Circle scale diameter (to outer ends of graduations):
 horizontal circle 220 mm
 vertical circle 135 mm
 Smallest division on circles $5'$
 For approximate adjustment of the alidade section, one-degree divisions are engraved on the horizontal circle. Readings on the one-degree scale are the same as microscope readings with a tolerance of $\pm 5'$
 Vertical axis is of the Repsold conical type
 The adjusting device, a knob, has a screw with a pitch of 0.25 mm and a head with 50 divisions

Spirit levels

Chamber-type vial
 Value of striding spirit level divisions $2'' - 2.5''$
 to 2 mm of arc
 Value of Talcott spirit level divisions $1.5''$ to 2 mm of arc

Overall dimensions and weight

Height of theodolite 590 mm
 Height of tripod 1100 mm
 Overall dimensions of storage case for lower part of instrument $428 \times 488 \times 428\text{ mm}$
 Overall dimensions of storage case for upper part of instrument $488 \times 478 \times 298\text{ mm}$
 Weight of tripod 13.2 kg
 Weight of theodolite 37.5 kg
 Weight of lower part of instrument in storage case 42.7 kg
 Weight of upper part of instrument in storage case 28.2 kg

Attachments

Interchangeable eyepiece for main telescope for a magnification of $56\times$
 Illuminators for field of view of main and auxiliary telescopes (2 pcs.)
 Caps for objectives of main and auxiliary telescopes (2 pcs.)
 Dark glasses for main telescope eyepiece (2 pcs.)
 Blind with 3 diaphragms of various size
 Shoes (3 pcs.)
 Cords with plugs and contacts (2 pcs.)
 Hand hammers (2 pcs.)
 Pencil illuminator
 Spare electric light bulbs (20 pcs.)
 Spare flash-light bulbs (4 pcs.)
 Large screw driver
 Small screw driver
 Watchmaker's screw driver
 Straight studs (2 pcs.)
 Bent studs (2 pcs.)
 Wrench for axial nut (adjustable)
 Wrench
 Soft brush
 Chamois leather, $200 \times 200\text{ mm}$
 Oil can with oil; in case
 Sectional-type tripod
 Circular spirit level for tripod
 Wrench for tripod nuts
 Storage case for lower part of instrument
 Storage case for upper part of instrument
 Storage case for tripod
 Box with tripod accessories (stored in tripod case)
 Packing cases for lower and upper parts of instrument with shock-absorber devices (2 pcs.)
 Spare keys for storage and packing cases of lower and upper parts of instrument (4 pcs. fitted in special recesses on the bottoms of the cases)
 Canvas covers for storage cases of lower and upper parts of instrument (2 pcs.)
 Cloth hood for the instrument
 Certificate and operating instructions for the instrument

TRIANGULATION THEODOLITE, MODEL TT 2/6

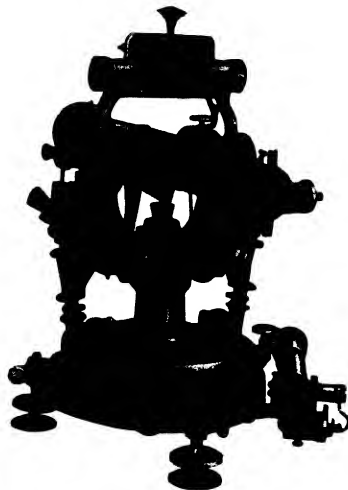


Fig. 4

The Triangulation Theodolite (Fig. 4) is a highly accurate geodetic instrument designed for measuring horizontal angles and zenith distances at first order triangulation points.

The survey of the stations of the geodetical base-line is carried out by triangulation.

Points are selected, in the region to be surveyed, that are located at a considerable distance from each other. When connected by straight lines (sighting lines), the system of points should form a number of triangles; each

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triangle being made as nearly equilateral as the conditions will permit. With the aid of this Theodolite, which is an instrument unsurpassed in accuracy, all the angles of the triangles are measured. When laying out a system or chain of triangles for highly accurate triangulation, the geographic co-ordinates (the latitude and longitude) of the apexes of the triangles can be determined by the aid of this instrument, on the basis of astronomical-geodetic observations.

In design, the instrument is sufficiently stable. This is one of the factors ensuring its high accuracy.

The instrument is manufactured of high quality metals and non-ferrous alloys.

The lacquered finish of the instrument as well as the golden lacquer coating on the geodetic micrometers enhance its appearance.

Readings, on the horizontal circle, are made by the aid of two micrometer microscopes having drum scale division values of 2". On the vertical circle, the readings are taken by means of scale microscopes with division values of 6". The instrument is furnished with electrical illumination for use in night surveying.

The main telescope of the instrument provides for measuring angles between signals located at a distance up to 60 km from the observer.

The Triangulation Theodolite comprises the following main parts:

Base of instrument (lower part) carrying the horizontal circle and the alidade with the micrometer microscopes;

Main telescope (upper part) with vertical arc and scale microscopes;

Striding spirit level;

Auxiliary telescope.

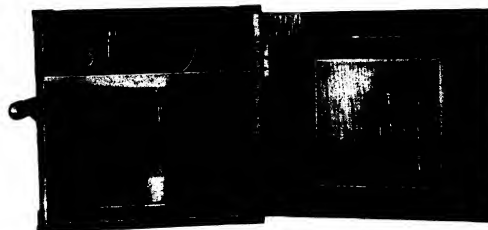


Fig. 5

The instrument is stored in two cases. The lower movement and base, striding spirit level, screw drivers, brush, studs, wrench, shoes and oil can with oil are stored in specially provided recesses of one case (Fig. 5).

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The other case (Fig. 6) contains the main telescope with the horizontal axis, auxiliary telescope, blind, detachable mirror, spare eyepiece, hand hammer, light filters and a special box with electrical accessories. All these items are fitted into special recesses.



Fig. 6

SPECIFICATIONS

Main telescope

Aperture of objective	65 mm
Resolving power of objective	2.15"
Focal length of objective	520 mm
Focal lengths of eyepieces	8 and 10 mm
Total magnification of telescope	32 \times and 65 \times
Diameters of exit apertures	1.0 and 1.25 mm
Fields of view	0' 43" and 0' 37"
Telescope focusing range	from 5 m to infinity
Distance to exit aperture	3.2 and 4.0 mm
Spider cross-hairs consisting of three horizontal hairs with an angular interval of 8' 35" and adjustable vertical bisector with an angular hair interval of 25"—30"	
The drum of the eyepiece micrometer has 100 divisions	
Value of micrometer drum scale divisions	1.0"

Auxiliary telescope

Auxiliary telescope — astronomical, straight type comprising a two-lens objective and an eyepiece with a micrometer	
Aperture of objective	36 mm
Resolving power of objective	4"
Focal length of objective	360 mm
Focal length of eyepiece	12 mm
Total magnification of telescope	30 \times

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Diameter of exit aperture	1.2 mm
Field of view	1°
Telescope focusing range	from 7 m to infinity
Distance to exit aperture	8.0 mm
Spider cross-hairs consisting of two horizontal hairs at an angular interval of 150" and an adjustable vertical bisector with an angular interval of 30"—35"	
The drum of the eyepiece micrometer has 100 divisions	
Value of micrometer drum scale divisions	1.4"

Reading micrometer microscopes for horizontal circle

Magnification of micrometer microscopes	49 \times
Focal length of objective	28.21 mm
Focal length of eyepiece	20.0 mm
Microscope field of view (visible portion of scale)	3.1 mm (1° 37' on limb)
Distance to exit aperture	9.56 mm
Value of micrometer drum divisions	2"
The drum has 60 divisions	
2.5 rotations of the screw correspond to a cross-hair bisector adjustment of 1 limb division	
The bisector consists of two pairs of spider cross-hairs	
Distance between axes of bisector	4"
Width of bisectors	53"
Pitch of micrometer screws	0.25 mm

Scale reading microscopes for vertical arc

Magnification of microscopes	48 \times
Focal length of objective	15.6 mm
Focal length of eyepiece	10.0 mm
Microscope field of view (visible portion of scale)	3 mm (2° 9' on vertical arc)
Distance to exit aperture	4.3 mm
The microscope scale has 10 divisions	
Ten scale divisions correspond to one arc scale division; reading accuracy	6"

Horizontal circle and vertical arc

Circle scale diameters (to outer ends of graduations):	
horizontal circle	220 mm
vertical arc	160 mm
Smallest division of horizontal circle	5'
Smallest division of vertical arc	10'
For approximate adjustment of the alidade section, one-degree divisions are engraved on the horizontal circle	
Readings on the one-degree scale are the same as microscope readings with a tolerance of $\pm 5'$	
Vertical axis is of the Repsold conical type	
The adjusting device, a knob, has a screw with a pitch of 0.25 mm and a head with 50 divisions	

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Spirit levels

Value of striding spirit level divisions 2''-2.5'' to
 The striding spirit level vial is of the chamber type 2 mm of arc
 Value of vertical arc spirit level divisions 6''-10''

Overall dimensions and weight

Overall dimensions of storage case for lower part of instrument ... 420×425×400 mm
 Overall dimensions of storage case for upper part of instrument ... 600×300×210 mm
 Overall dimensions of packing case for lower part of instrument ... 660×560×605 mm
 Overall dimensions of packing case for upper part of instrument ... 850×390×450 mm
 Weight of lower part in storage case 27 kg
 Weight of upper part in storage case 17 kg
 Weight of lower part in storage and packing cases 59 kg
 Weight of upper part in storage and packing cases 38 kg

Attachments

Interchangeable eyepiece for main telescope for a magnification of 65×	Adjustable wrench
Illuminators for field of view of main and auxiliary telescopes (2 pcs.)	Soft brush
Caps for objectives of main and auxiliary telescopes (2 pcs.)	Chamois leather, 200×200 mm
Mirror for vertical arc spirit level	Oil can with oil, in case
Blind with 3 diaphragms of various size	Storage cases for upper and lower parts of instrument (2 pcs.)
Shoes (3 pcs.)	Packing cases for upper and lower parts of instrument with shock-absorbing devices (2 pcs.)
Cords with plugs and contacts (2 pcs.)	Spare keys for storage and packing cases of upper and lower parts of instrument (4 keys fitted into special recesses on the outside of the bottoms of the cases)
Hand hammers (2 pcs.)	Canvas covers for storage cases of upper and lower parts of instrument (2 pcs.)
Pencil illuminator	Cloth hood for the instrument
Spare electric light bulbs (20 pcs.)	Certificate and operating instructions for the theodolite
Spare flash-light bulbs (4 pcs.)	
Large screw driver	
Small screw driver	
Watchmaker's screw driver	
Straight studs (2 pcs.)	
Bent studs (2 pcs.)	

OPTICAL THEODOLITE, MODEL OT-02

Fig. 7

The Optical Theodolite (Fig. 7) is designed for measuring horizontal and vertical angles at higher order triangulation and polygonometric points, as well as for astronomical observations.

The small size, hermetic design, and comparatively small weight of the instrument, in conjunction with the speed and convenience of its operation provide for the possibility of its wide application in geodetic surveys of difficult, mountainous or distant regions. Besides this, the instrument can be advantageous-

ly used in industry (machine-tool building, underground construction, etc.) where the accurate measurement of horizontal and vertical angles is required.

Readings on the horizontal and vertical limbs are combined by the aid of the optical systems of the horizontal and vertical circle microscope objectives into a single field of view of the reading microscope whose eyepiece is arranged side by side with the telescope eyepiece. Readings are taken with a single optical microscope having a seconds disc scale divisions value of $0.2''$.

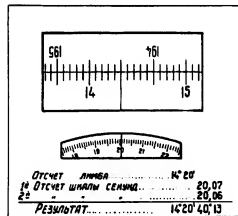
The instrument can be used the whole year around, as it provides for normal operation at temperatures from -25°C to $+50^{\circ}\text{C}$ (from -13°F to $+122^{\circ}\text{F}$).

The instrument has electric illumination.

For making astronomical observations, the instrument is furnished with a removable prism attachment having a dark light filter.

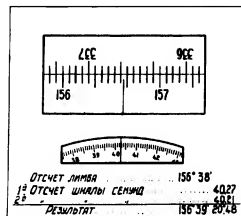
The Optical Theodolite comprises three main parts: lower part of the theodolite, intermediate part and telescope with horizontal axis.

The telescope is the central, astronomical type with interior focusing. It consists of the telephotolens and three interchangeable eyepieces.



Limb reading — $14^{\circ}20'$
1st second scale reading $20.07''$
2nd second scale reading $20.06''$
RESULT $14^{\circ}20'40.13''$

Fig. 8



Limb reading — $156^{\circ}38'$
1st second scale reading $40.27''$
2nd second scale reading $40.21''$
RESULT $156^{\circ}39'20.48''$

Fig. 9

Figs. 8 and 9 illustrate the field of view of the reading microscope. Rotating the head actuates the optical micrometer for achieving an exact coincidence of the limb graduations. When the graduations coincide, the degrees and minutes are read on the upper scale. The lower (seconds) scale reading is taken and is multiplied by 2. An alternate method (to increase the accuracy of coincidence of the graduations) is to repeat the coinciding of the graduations and to add the two readings taken on the seconds scale.

SPECIFICATIONS

Main telescope

Visible magnification of telescope	24 \times , 30 \times and 40 \times
Aperture of telephotolens	60 mm
Focal length of telephotolens	350 mm
Fields of view	1 $^{\circ}40'$; 1 $^{\circ}20'$ and 1 $^{\circ}0'$
Resolving power of telephotolens	2.4 $''$
Focal lengths of eyepieces	8.6; 11.7 and 14.6 mm
Diameters of exit apertures	1.5; 2.0 and 2.5 mm
Telescope focusing range	from 5 m to infinity
Length of telescope	265 mm
Angular interval of bisector	35 $''$
Thickness of cross-hairs	7-8 microns
Maximum inclination of telescope	65 $^{\circ}$

Reading devices:

for horizontal limb — one optical system of the horizontal circle microscope objective with magnification of 4 \times ;

for vertical limb — one optical system of the vertical circle microscope objective with magnification of 3 \times ;

for horizontal and vertical limbs — one reading microscope with a magnification of 9.3 \times ; consequently the total magnification of the microscope is:

for the horizontal limb	37 \times
for the vertical limb	28 \times

The reading microscope has a field of view of 8×3.8 mm which corresponds to:

on horizontal limb	1 $^{\circ}40'$
on vertical limb	3 $^{\circ}20'$

Distance to exit apertures of reading microscope:

for horizontal limb	25.5 mm
for vertical limb	25.0 mm

Diameters of exit apertures of reading microscope:

for horizontal limb	1.7 mm
for vertical limb	1.6 mm

The horizontal and vertical limbs are made of optical glass

Scale circle diameters (to inner ends of graduations):

horizontal limb	135 mm
vertical limb	90 mm

Smallest division of limbs:

horizontal	4 $''$
vertical	8 $''$

Thickness of limb graduation lines:

horizontal limb	6-7 microns
vertical limb	7-8 microns

Axes

Vertical axis — cylindrical, self-adjusting type with a ball support on the tapered part of the box
 Horizontal axis — cylindrical sectional type with internal support on cylindrical bearings.

Spirit levels

Value of horizontal limb alidade level scale divisions to 2 mm of arc... 6"—7"
 Value of vertical limb alidade level scale divisions to 2 mm of arc... 10"—12"

Overall dimensions and weight

Height of theodolite 404 mm
 Overall dimensions of storage case diam. 233 × 423 mm
 Weight of theodolite 11 kg
 Weight of theodolite in storage case 15 kg

Attachments

Illuminating mirrors (2 pcs.)	Wrench
Illuminating lamps (2 pcs.)	Stud for adjustment screw
Eye-piece attachment	Various screw drivers
Interchangeable eyepieces 24× and 40× (2 pcs.)	Studs (2 pcs.)
Socket plug	Adjustable wrench
Cap for objective	Brush
Centering plate	Flannel napkin
Tripod	Can of oil
Metal sheath	Electric light bulbs (10 pcs.)
Device for carrying the theodolite	Hoods (2 pcs.)
Hand hammer	Bag for plate and accessories
	Certificate and operating instructions for the theodolite

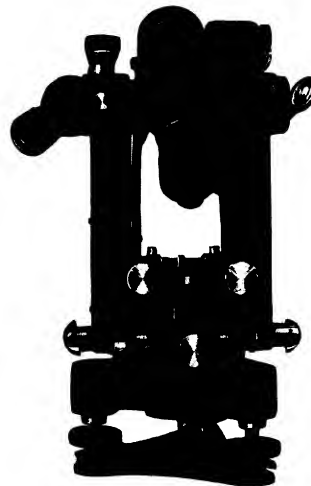
OPTICAL THEODOLITE, MODEL OT-10

Fig. 10

The Optical Theodolite (Fig. 10) is designed for various types of geodetic surveys and can be used for third order triangulation, second and third order polygonometry as well as for running theodolite traverses.

The horizontal and vertical limbs are made of optical glass.

Readings on the horizontal and vertical limbs are combined in the field of view of a micrometer microscope located on the standard opposite the vertical circle.

Readings on the limbs are taken by a single micrometer microscope whose smallest drum scale division equals 20".

The micrometer microscope tube and the telescope can be inverted through the zenith.

Figs. 11 and 12 illustrate the field of view of the reading microscope and the reading drum of the micrometer screw.

Horizontal circle readings are taken as follows (Fig. 11):

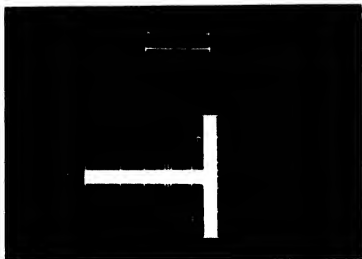


Fig. 11

1. On the upper image of the horizontal circle scale, in reference to the stationary index, read the degrees and full 20-minute intervals on the circle;

2. Rotate the micrometer drum until the vertical adjustable bisector coincides with the upper graduation of the circle to the left of the index and take the drum scale reading;

3. Rotate the micrometer drum until the vertical adjustable bisector coincides with the lower graduation of the circle to the left of the index and take the drum scale reading;

4. Add the circle and micrometer readings.

Limb reading	245° 40'
1st reading on drum scale	4' 25"
2nd reading on drum scale	4' 23"

RESULT 245° 48' 48"



Fig. 12

Vertical circle readings are taken as follows (Fig. 12):

1. Rotate the micrometer drum until the adjustable bisector coincides with the stationary index;

2. Using the horizontal bisector as an index, read the number of degrees and full 20-minute intervals (below the bisector) on the vertical circle;

3. Rotate the micrometer drum until the adjustable horizontal bisector coincides with the lower graduation on the vertical circle and take the micrometer drum scale reading;

4. Repeat by coinciding the bisector on the same circle graduation;

5. Add the readings.

Reading on vertical circle	2° 20'
1st reading on drum scale	6' 32"
2nd reading on drum scale	6' 30"

RESULT 2° 33' 02"

SPECIFICATIONS

Magnification of telescope	25.3x
Telescope field of view	1° 10'
Aperture of objective	40 mm
Diameter of exit aperture	1.5 mm
Focal length of objective	253 mm
Telescope focusing range	from 1.5 m to infinity

Value of micrometer drum scale divisions for vertical and

horizontal circles

Value of smallest division of vertical and horizontal circles

Value of horizontal circle alidade level scale divisions to 2 mm of arc

Value of vertical circle alidade level scale divisions to 2 mm of arc

Overall dimensions and weight

Total height of theodolite	280 mm
Length of tripod with legs retracted	970 mm
Maximum length of tripod	1510 mm
Overall dimensions of theodolite case	340×280×340 mm
Overall dimensions of case with shock-absorber device for transporting the theodolite	410×380×520 mm
Weight of theodolite with levelling base	6.3 kg
Weight of theodolite in storage case with accessories	17 kg
Weight of tripod	5.8 kg
Weight of case with shock-absorber device for transporting the theodolite	13 kg
Weight of complete outfit	35.8 kg

Attachments

Eye-piece prism	Sun blind
Theodolite case with shoulder straps	Canvas case for theodolite
Extensible tripod with fastening screw	Oil can with oil
Case with shock-absorber device for transporting the theodolite	Adjustable wrench
Vertical circle spirit level	Tripod wrench
Horizontal circle spirit level	Screw driver with 4 blades
Plumb bob hook	Studs for screws (2 pcs.)
Plumb bob with counter-weight, hook and cord	Brush
	Napkin, 200x200 mm
	Certificate and operating instructions for the theodolite

OPTICAL THEODOLITE, MODEL ТБ-1

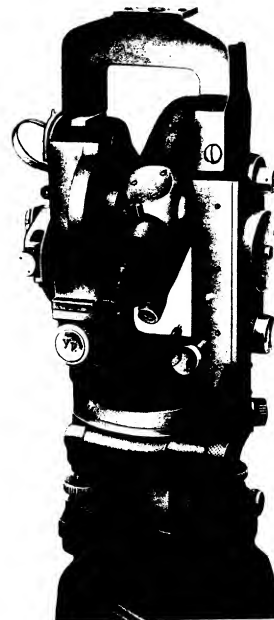


Fig. 13

The Optical Theodolite (Fig. 13) is designed for measuring angles in second and third order triangulation, for astronomical observations as well as for measuring angles in first and second order polygonometry.

Readings on the horizontal and vertical limbs are combined, by the aid of the optical systems of the horizontal and vertical limb microscope objectives, into a single field of view of the reading microscope whose eyepiece is arranged side by side with the telescope eyepiece.

Readings are taken with a single optical micrometer to an accuracy of 1".

The theodolite has stadia hairs for measuring distances with the aid of horizontal or vertical stadia rods.

The instrument can be fitted for night operations.

The instrument is furnished with zenith attachments on the telescope and microscope for astronomical observations.

Due to its small size and comparatively small weight, as well as the ease in reading the horizontal and vertical limbs, this instrument provides for the possibility of achieving highly efficient performance.

Besides geodetic and astronomical operations, this instrument can be used for measuring horizontal and vertical angles in industrial enterprises, in the erection of various types of construction, etc.

SPECIFICATIONS

Telescope

Magnification of telescope	25.4×
Field of view	1° 30'
Diameter of exit aperture	1.5 mm
Distance of exit aperture from last surface of eyepiece	6.7
Minimum sighting distance	1.2 m
Resolving power	4"
Stadia constant coefficient	100
Magnification of eyepiece	25.5
Adjustment of eyepiece	± 5 diopters
Focal length of objective with focusing lens	249.7 mm
Focal length of eyepiece	9.8 mm

Microscopes

	Horizontal limb diam. 85 mm	Vertical limb diam. 75 mm
Magnification	47×	52.3×
Diameter of exit aperture	1.3 mm	1.7 mm
Distance of exit aperture	12 mm	12 mm
Adjustment of eyepiece	± 5 diopters	± 5 diopters

Optical plumbing device

Magnification	1.4×
Field of view	8° 17'
Diameter of exit aperture	4 mm
Distance of exit aperture	7 mm
Minimum sighting distance	0.7 m
Adjustment of eyepiece	± 5 diopters

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Spirit levels

Value of horizontal limb alidade cylindrical level divisions	12"—20" to 2 mm of arc
Value of vertical limb cylindrical level divisions	17"—25" to 2 mm of arc
Value of spherical spirit level divisions	7"—12" to 2 mm of arc

Overall dimensions and weight

Height of instrument with tripod	2035 mm
Overall dimensions of case	285×210×400 mm
Overall dimensions of box with storage batteries	238×165×180 mm
Weight of theodolite without case	5.1 kg
Weight of theodolite in case and with accessories	9.1 kg
Weight of tripod with sighting rod	6.25 kg
Weight of box with storage batteries	5.9 kg

Attachments

Tubular surveying compass	Zenith attachment for telescope
Bridge for sighting rod	Zenith attachment for microscope
Brightening chamber	Storage battery with box and cable
Tripod with fastening screw	Set of accessories
Sighting rod	Certificate and operating instructions for using the theodolite
Centering device	

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СТАНКОИМПОРТ

СТАНКОИМПОРТ

THEODOLITE TACHEOMETER, MODEL TT-50



Fig. 14

The Theodolite Tacheometer (Fig. 14) is an angle measuring instrument designed for measuring horizontal and vertical angles with a reading accuracy of 30" as well as for measuring distances by the stadia method using stadia rods.

This theodolite finds its widest application in geotopographic surveys.

In design the Theodolite Tacheometer is of the repeating type of theodolites. A surveying compass is provided with the theodolite for orientation in reference to the magnetic meridian.

In operation, the theodolite is set up on the tripod and fastened with the locking screw. The theodolite is centered with a plumb-line.

The optical system of the theodolite has coated ("blue") lenses. This increases the transmission of light and facilitates observation under conditions of poor illumination.

The Theodolite Tacheometer ensures normal operation at temperatures from -40°C to $+45^{\circ}\text{C}$ (from -40°F to $+113^{\circ}\text{F}$).

SPECIFICATIONS

Telescope magnification	25.3x
Telescope field of view	1° 10'
Stadia constant coefficient	100
Resolving power of objective, not over	4.5"
Telescope focusing range	from 1.5 m to infinity
Value of horizontal circle spirit level divisions	40" 60"
Value of vertical circle spirit level divisions	25" 40"
Reading accuracy on horizontal and vertical circles	30"

Overall dimensions and weight

Overall dimensions of theodolite case	340 × 260 × 340 mm
Total weight of the theodolite outfit with accessories, case and tripod ..	16.7 kg

Attachments

Surveying compass (striding type)	Metal screw driver with four blades
Tripod	Studs for screws (2 pcs.)
Theodolite case with shoulder straps	Tripod wrench
Plumb-bob with counter-weight, hook and cord	Conical center nut wrench
Light filter in mount	Oil can with oil
Blind	Brush
Canvas case for theodolite	Napkin
Adjustable wrench	Certificate and operating instructions for the theodolite

MINE THEODOLITE, MODEL TT-1



Fig. 15

The Mine Theodolite (Fig. 15) is designed for the measurement of horizontal and vertical angles. The arrangement of a spirit level on the telescope allows the instrument to be used for levelling operations.

Linear distances can be measured by using the stadia cross-hairs.

The theodolite is used for all underground and surface mine surveying, for various topographical work as well as for astronomical-geodetic observations of the corresponding accuracy. For the latter purpose, the theodolite is furnished with a prism and a dark glass (light filter).

The theodolite comprises the following main parts:

1. Lower part consisting of a limb with a silver ring, on which the divisions are engraved, and the levelling base which are connected together by a system of conical centers;
2. Upper part consisting of the telescope to which the vertical graduated limb is attached. They are connected by the horizontal axis of rotation of the telescope;
3. Horizontal axis of rotation of telescope which is supported in the bearings of the standard that connect the upper and lower parts of the theodolite;
4. Four spirit levels (striding, on the guard and standard, on the telescope, on the vertical circle alidade).

SPECIFICATIONS

Reading accuracy on horizontal circle	30"
Reading accuracy on vertical circle	30"
Focusing range	from 2 m to infinity
Telescope magnification	$21 \times \pm 5\%$
Telescope field of view	$1.8' \pm 5''$
Focal length of objective	210 mm
Aperture of objective	25 mm
Stadia constant coefficient	100
Value of spirit level divisions:	
striding	$20'' \pm 2''$
on guard and standard	$50'' \pm 10''$
on telescope	$35'' \pm 5''$
on vertical circle alidade	$35'' \pm 5''$
Diameter of horizontal circle	120 mm
Diameter of vertical circle	90 mm

Overall dimensions and weight

Height of theodolite without tripod	300 mm
Weight of theodolite:	
in packing	9.3 kg
without packing	4.3 kg
Weight of extensible tripod	6.1 kg

Attachments

Extensible tripod with fastening screw	Shoes (3 pcs.)
Case for theodolite with accessories	Canvas case
Striding spirit level	Spare cross-hairs diaphragm in mount
Zenith prism	Studs (2 pcs.)
Dark glass in mount (light filter)	Can with oil
Blind	Wrench for axes
Reflector for illuminating cross-hairs	Napkin
Plumb-bob	Spare screws in cross-hair diaphragm mount (4 pcs.)
Brush	Certificate and operating instructions for the theodolite
Screw driver	

PILOT BALLOON THEODOLITE, MODEL 1117



Fig. 16

The Pilot Balloon Theodolite (Fig. 16) is designed for determining the azimuth and height of pilot balloons during meteorologic observations.

One of the methods of investigating phenomena taking place in the upper layers of the atmosphere (as for instance: velocity, direction and constancy of

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the wind, etc.) is the observation of the flight of pilot balloons (or sounding balloons). Special instruments are used to observe the flight of such balloons and to register data concerning their height, direction and velocity. They are also used for the solution of a number of problems concerning aircraft in general. The simplest of these special instruments is the pilot balloon theodolite.

For operation, these instruments are set up in two or even three locations in the region. The bearings of the locations and the distance between them is known beforehand. The position of an observed point in space will be determined if the angular values of the spherical co-ordinates or some other, for instance, graphical expression of these values is measured from the locations of the instruments. One such paired measurement is sufficient for stationary points. If the point is moving continuously, in each successive moment, the co-ordinates determining its position, will differ from the previous co-ordinates. Consequently, in this case, it is necessary to make a number of such determinations and the paired observations should be made simultaneously.

The computed results of such data, registered by pilot balloon theodolites, in the case of a moving point will furnish a number of its successive positions in space. This allows the path of the point to be determined as well as its velocity if the time is known. The Pilot Balloon Theodolite ensures normal operation at temperatures from -40°C to $+45^{\circ}\text{C}$ (from -40°F to $+113^{\circ}\text{F}$).

SPECIFICATIONS

Telescope magnification	12x
Telescope field of view	3' 45"
Diameter of exit aperture	3.4 mm
Value of horizontal and vertical circle divisions	1"
Reading accuracy on circles	0.1
Value of spirit level divisions	6' to 0.6 mm of arc

Overall dimensions and weight

Overall dimensions of theodolite case	200 x 250 x 340 mm
Overall dimensions of storage battery case	125 x 110 x 160 mm
Overall dimensions of levelling base case	120 x 130 x 110 mm
Length of folded tripod	950 mm
Weight of theodolite	3.8 kg
Weight of tripod	5.8 kg
Weight of complete outfit	15.8 kg

Attachments

Illuminating device	Case with storage batteries
Canvas case	Certificate and operating instructions for the theodolite
Storage case	
Tripod	

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СТАНКОИМПОРТ

СТАНКОИМПОРТ

PRECISE LEVEL, MODEL HA-1



Fig. 17

The Precise Level (Fig. 17) is an instrument designed for determining the relative elevation of points in a locality. It is designed for carrying out first order levelling operations.

In comparison with other designs of levels for high-accuracy levelling, the Precise Level has a number of advantageous features:

1. The application in this instrument of an interior focusing telescope shortens the length of the telescope and eliminates the possibility of the penetration of dust and dirt into the optical parts.
2. The spirit level is of the contact type. The images of the ends of the spirit level bubble are seen on the telescope cross-hairs. This is of considerable convenience in operation and speeds up readings on the spirit level.
3. The plane-parallel plate of the reading mechanism is arranged before the telescope objective. This allows various methods of levelling to be used.
4. The vertical axis is of the cylindrical type. This ensures normal operation at a sufficiently large range of temperatures, requires no adjustments and lengthens the term of service of the instrument.

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The difference in elevation of point in a locality is determined by the difference in readings on the foresight and backsight rods. During this operation the sighting axis of the telescope must be parallel to the axis of the cylindrical spirit level. Measurement as well as checking of the instrument should be commenced from 15 to 30 minutes after unpacking the level, when the instrument reaches the ambient temperature.

SPECIFICATIONS

Telescope magnification	44x
Vertical field of view of the telescope	60°
Horizontal field of view of the telescope	40°
Aperture of objective	55 mm
Diameter of exit aperture	1.25 mm
Distance to exit aperture	6 mm
Magnification of eyepiece	27x
Resolving power of telescope	3"
Total focal length of objective	411 mm
Sighting range	from 3.6 m to infinity
Stadia constant coefficient	100
Value of cylindrical spirit level divisions	10" to 2 mm of arc
Magnification of bubble image	2.5x
Value of cross-type spirit level divisions	2" to 2 mm of arc
Normal levelling distance	60-65 m
Mean systematic error in measurement for double-rod levelling per km	± 0.3 mm

Overall dimensions and weight

Length of telescope with attachment	400 mm
Height of instrument with levelling screws screwed-in	200 mm
Overall dimensions of case	400 x 240 x 170 mm
Length of tripod	1400 mm
Weight of instrument with attachment	5.8 kg
Weight of case	4.0 kg
Weight of tripod	6.5 kg

Attachments

Storage case	Stud
Tripod	Can with oil
Fastening screw	Napkin, 200 x 200 mm
Wrench for tripod	Sun blind
Screw driver	Certificate and operating instructions for the level

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СТАНКОИМПОРТ

СТАНКОИМПОРТ

ENGINEER'S LEVEL, MODEL HT

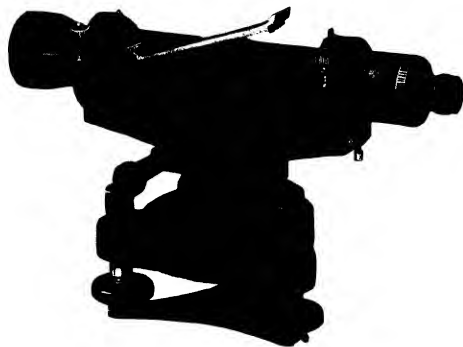


FIG. 18

The Engineer's Level (Fig. 18) is of the type of levels in which the telescope can be lifted out of its supports, turned end for end and replaced. It is designed for determining the difference in elevation between points in a locality for technical levelling operations.

The Engineer's Level is used for engineering, as well as ordinary geodetic work requiring an accuracy of performance equalling a mean square error of ± 3 mm per station or ± 2 mm per rod-reading with average distances between the rods of about 100 m. The sighting axis can be levelled with an accuracy of $5''$ — $10''$.

A direct reading is taken on the rod to 1 mm.

SPECIFICATIONS

Telescope magnification	31.4×
Telescope field of view	1°
Aperture of objective	34 mm
Diameter of exit aperture	1.1 mm
Distance to exit aperture	8.0 mm

Magnification of eyepiece	25×
Resolving power of telescope	4.5''
Sighting range	from 3 m to infinity
Stadia constant coefficient	100
Value of cylindrical spirit level divisions	17''—25'' to 2 mm of arc
Value of circular spirit level divisions	7'—15' to 2 mm of arc

Overall dimensions and weight

Length of telescope	270 mm
Height of level	165 mm
Overall dimensions of case	200×170×300 mm
Length of tripod	1425 mm
Weight of level	2.45 kg
Weight of case with accessories	3.1 kg
Weight of tripod	4 kg
Weight of complete outfit	9.55 kg

Attachments

Fastening screw	Flannel napkin, 200×200 mm
Sun blind	Storage case with accessories
Tripod	Certificate and operating instructions for the level
Can of oil	

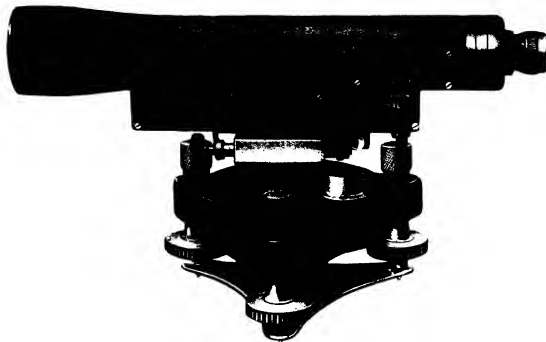
DUMPY LEVEL, MODEL HT

Fig. 19

The Dumpy Level (Fig. 19) is designed for determining the difference in elevation between points in a locality during levelling operations.

This Level finds wide applications in various engineering and geodetic work. This instrument differs from other designs in that the spirit level and telescope are rigidly fastened to the upper part of the instrument. The use of a system of prisms for observing the spirit level bubble doubles the accuracy of adjustment in levelling the telescope.

SPECIFICATIONS

Telescope magnification	31×
Telescope field of view	1°
Diameter of exit aperture	1.1 mm
Distance to exit aperture	7 mm
Resolving power of telescope	4.5"
Minimum limit of sighting	3 m
Stadia constant coefficient	100
Magnification of eyepiece	25.5×
Total focal length of objective system	314 mm

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Value of cylindrical spirit level divisions	17"—23" to 2 mm of arc
Value of circular spirit level divisions	7"—15" to 2 mm of arc

Overall dimensions and weight

Length of telescope	270 mm
Height of instrument	150 mm
Overall dimensions of storage case	200×170×300 mm
Length of tripod	1500 mm
Weight of instrument	2.25 kg
Weight of case with accessories	3.1 kg
Weight of tripod	4 kg
Weight of complete outfit	9.35 kg

Attachments

Tripod	Storage case with accessories
Fastening screw	Certificate and operating instructions for the level
Sun blind	

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СТАНКОИМПОРТ

СТАНКОИМПОРТ

MINE LEVEL, MODEL HH-1

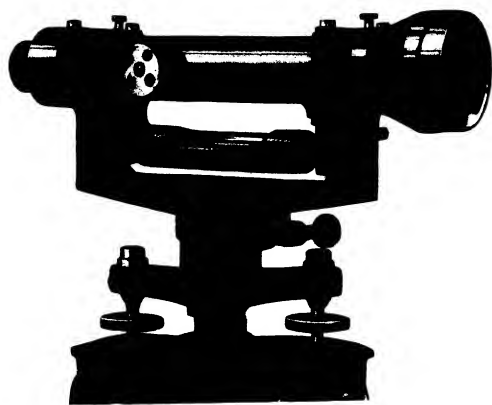


Fig. 20

The Mine Level (Fig. 20) is an instrument used for determining the difference in elevation in a locality and is designed for surface and underground third and fourth order levelling operations.

Linear distances can be measured during levelling.

This model is an engineering level of the wye type with the spirit level fastened to the telescope. It is widely used for levelling operations in pits and mines.

SPECIFICATIONS

Visible telescope magnification	31 \times
Telescope field of view	1.5°
Focal length of the telescope optical system	310 mm
Aperture of objective	36 mm
Stadia constant coefficient	100
Value of spirit level divisions	15" to 2 mm of arc

Overall dimensions and weight

Length of telescope	242 mm
Height of level	155 mm
Weight of instrument without packing	2.7 kg
Weight of instrument in packing	5.2 kg
Weight of extensible tripod	5.2 kg

Attachments

Tripod with fastening screw	Can with oil
Case for level with accessories	Brush
Illuminator	Napkin
Screw driver	Certificate and operating instructions for the level
Studs (2 pcs.)	

OPTICAL ALIDADE, MODEL KB-1



Fig. 21

The Alidade (Fig. 21) complete with a metal plane table, tripod and drawing board are designed for topographical surveying of localities in scales of 1 to 100 and 1 to 10000, as well as for inscribing horizontal lines on photomaps.

The alidade has a glass vertical circle which, besides the usual circular scale, has special curves, engraved on its surface, to provide for reading directly elevations and horizontal distances without reading angles and carrying out tiresome computations. The working surface of the vertical circle is in the focal plane of the objective. Due to this, the observer can either read vertical angles or, using the curves, he can directly read elevations and horizontal distances, or, finally, both methods can be combined.

Direct reading on the curves speeds up surveying operations by 1.5—2 times.

The vertical circle of the alidade is hermetically enclosed and protected by a metal guard.

A box compass is arranged on the ruler. The ruler is also furnished with a parallelogram device which eliminates the necessity of simultaneously sighting the stadia rod and aligning the edge of the ruler with the point of the plane table.

Vertical angles can be read to an accuracy of 1 minute. The error in elevation readings on the curves does not exceed 50 mm at a distance of 100 m. The error in measuring horizontal distances on the curves does not exceed 0.5%.

SPECIFICATIONS

Magnification of telescope	29×
Telescope field of view	1° 30'
Diameter of exit aperture	1.95 mm
Distance to exit aperture	8.2 mm
Resolving power	4.5"
Aperture of objective	10 mm
Value of telescope spirit level divisions	30"
Value of limb spirit level divisions	30"
Value of scale divisions	2 mm
Value of limb divisions	10'
Value of compass scale divisions	30'

Overall dimensions and weight

Length of alidade ruler	580 mm
Height of alidade	230 mm
Length of tripod	1570 mm
Size of drawing-board	600 x 600 mm
Weight of alidade and plane table in case	10.25 kg
Weight of drawing-board in canvas case	7 kg
Weight of tripod	5.4 kg
Weight of complete outfit	23 kg

Attachments

Plane table in case	Sun blind
Tripod	Accessories and spare parts
Drawing-board in canvas case	Certificate and operating instructions for the alidade
Box compass	

ALIDADE, MODEL KB

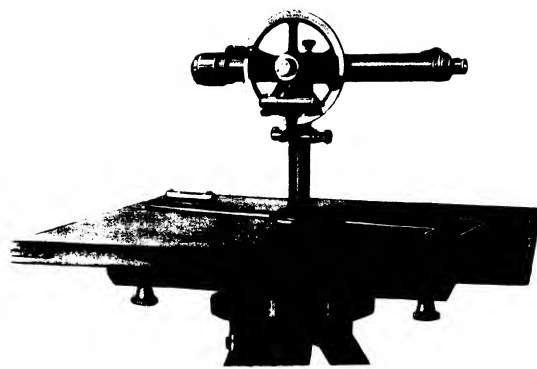


Fig. 22

The Alidade (Fig. 22) complete with a plane table, tripod and drawing-board is designed for topographical surveys of localities and for inscribing horizontal lines on photomaps.

The alidade has an open-type vertical circle and two reading glasses for opposite readings on the circle. Vertical angles can be read to an accuracy of one minute.

A box compass is furnished to orient the plane table in reference to the magnetic meridian.

SPECIFICATIONS

Magnification of telescope	25×
Aperture of objective	34 mm
Focal length of objective	380 mm
Focal length of eyepiece	15 mm

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Telescope field of view	1°
Minimum sighting distance	5 m
Stadia constant coefficient	100
Value of smallest vertical circle divisions	30'
Value of vertical circle spirit level divisions	30'' - 50''
Value of ruler spirit level divisions	50'' - 80''
Smallest division of compass scale	30'

Overall dimensions and weight

Length of alidade rule	530 mm
Height of alidade (to horizontal axis)	295 mm
Length of tripod	1250 mm
Size of drawing-board	600/600 mm
Weight of alidade	5.0 kg
Weight of plane table	5.5 kg
Weight of drawing-board	1.5 kg
Weight of tripod	1.6 kg
Weight of complete outfit	38.2 kg

Attachments

Plane table in case	Box compass
Tripod	Sun blind
Drawing-board in canvas case	Certificate and operating instructions for the alidade

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СТАНКОИМПОРТ

СТАНКОИМПОРТ

SURVEYING COMPASS, MODEL БС



Fig. 23

The Surveying Compass (Fig. 23) is an improved geoletic compass and is used as an independent field instrument for orientation in reference to points of the compass, as well as for measuring horizontal angles and azimuths.

This compass is used for finding the bearings of base points in reconnaissance operations; especially in heavily wooded localities and near rivers, as well as for sketching details located within the surveyed areas.

SPECIFICATIONS

Value of limb divisions.....	1°
Accuracy of reading angles and azimuths	5'
Distance between vertical sights	84 mm
Value of compass circle divisions	1°
Weight of instrument	0.8 kg

Attachments

Plumb line	Storage case
Screw driver	Certificate and operating instructions for the compass

GONIOMETER, MODEL ГР

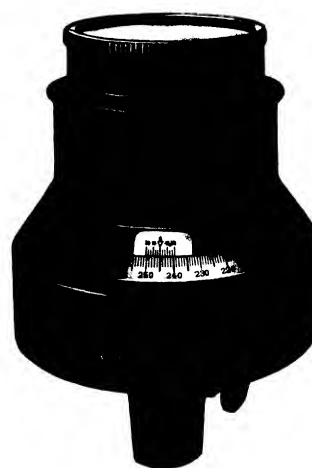


Fig. 24

The Goniometer (Fig. 24) is the simplest of angle measuring instrument for use in the field and it fully replaces a surveying compass and an optical square. It is used to measure horizontal angles in reference to compass points, azimuths and between sighting directions.

The angles between directions can be read, simultaneously, on the limb and, using the compass, by their bearings.

The goniometer is used for surveying and pegging out a locality.

SPECIFICATIONS

Value of limb divisions.....	1°
Reading accuracy of angles and azimuths	5'

Distance between sights 80 mm
 Value of compass circle divisions 1°
 Weight of instrument 1.2 kg

Attachments

Plumb line
 Screw driver
 Storage case
 Certificate and operating instructions for the goniometer

GEODETIC OPTICAL SQUARE, MODEL ЭГ-2



Fig. 25

The Optical Square (Fig. 25) is a geodetic instrument used for pegging out perpendicular directions to the line of sight. It is of the mirror type.

SPECIFICATIONS

Angle between mirrors 15° ± 2°
 Length of instrument 140 mm
 Width of instrument 50 mm
 Weight of optical square 0.11 kg
 Weight of canvas case 0.035 kg

Attachments

Canvas case
 Flannel napkin, 100 × 100 mm
 Certificate and operating instructions for the optical square

PRECISE CHECKERED LEVELLING RODS, MODEL 51-T-86

Precise Checkered Levelling Rods are used in first and second order levelling operations.

They are made of fine-grained pine-wood (aviation type).

The rods are graduated on both faces; one face has centimeter checker squares and half-centimeter divisions in black paint; while the opposite face has 11-millimeter squares in red paint and graduations analogical with the first face.

A circular spirit level is attached to one side of the rod while a plumb line may be fastened to the other side for checking the spirit level.

A steel plate is fastened to the lower end of the rod and is used for setting the rod up on the convex spherical projection of the levelling shoe.

The values of the divisions are inscribed as follows:

on black face — at decimeter intervals (from 0 to 30),

on red face — at 11-centimeter intervals (from 01 to 28).

Three control markings are provided on each face. They are arranged at a distance of one meter from each other.

Precise levelling rods are furnished in sets of two pieces.

SPECIFICATIONS

Overall dimensions and weight

Overall dimensions of rod	47×84×3000 mm
Overall dimensions of rod extension	28×72×1200 mm
Weight of rod	3.4 kg
Weight of rod extension	1.2 kg

Attachments

Circular spirit levels (2 on rods and 2 spares in mounts)	Screw drivers for spirit level adjusting screws (2 pcs.)
Plumb bobs with lines (2 pcs.)	Studs for attaching rod extension (4 pcs.)
Handles (rod supports) (4 pcs.)	Device for holding plumb lines and checking circular levels (on the rods)
Canvas cases for rods (2 pcs.)	Storage case (with lock) for precise rods and accessories for extension rod
Wooden extension rod	
Canvas case for extension rod	

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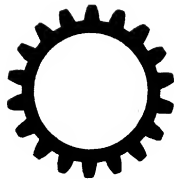
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INTRODUCTION

The purpose of this booklet is to give the users general information on abrasives as well as some hints as how to select exactly the right grinding tool for their particular jobs.

In general the word abrasives is used to designate all hard grinding materials in all forms of monoliths of grains as well as various tools made of such materials, with the aid of which metals, minerals and other materials are processed by grinding, polishing, lapping, honing and other operations which take off a relatively fine layer from the surface to be machined.

Abrasives are used for both rough grinding and finishing of diverse materials, for sharpening and lapping of cutting tools, for finish grinding of gears, for honing, lapping, polishing and finishing of precision parts.

Grinding practice plays a constantly increasing part in modern production, gradually substituting planning and milling of flat surfaces, turning and boring, thread cutting, etc.

The grinding capacity of abrasives is determined by three factors: efficiency, produced surface finish and durability.

It should be borne in mind that there are no such abrasives which can handle any job and it is therefore of paramount importance to have a thorough knowledge of the particular properties of each given tool in order to ensure its correct use.

We trust that the present booklet will help the users to improve their production and to cope with the new grinding problems continually arising.

ABRASIVE MATERIALS

II abrasive materials are divided into two groups: natural and artificial ones.

NATURAL ABRASIVE MATERIALS

Quartz—is of a dull black, yellowish or red colour and is found in the form of lumps, pebble or sand. It is an anhydrous crystalline silicic acid. The hardness of quartz is 7. Silicon—which is a crystalline variety of quartz—crushed to small particles is used for the production of abrasive cloth mainly intended for the finishing of wooden articles.

Emery—is a rock, consisting of a natural oxide of aluminium (up to 25-30%), mixed with a varying amount of iron oxide, quartz and silicates. Depending on the contents of impurities the hardness of emery varies between 7.2 and 7.5. Due to its comparatively low hardness and the non-uniformity of its grinding properties, emery has nowadays a very limited field of applications as an abrasive material. Emery is mainly used in the shape of grains which are pasted on soft felt wheels for polishing of cutlery, hardware, etc.

Corundum—is a mineral, chiefly consisting of crystalline aluminium oxide mixed with a small amount of quartz, mica, etc. The hardness of corundum is 9. The corundum crystals are remarkable by their glassy glitter and are more or less transparent. Depending on the amount of impurities particularly iron oxide, the corundum may be of different colours—bluish-grey, grey, blue, brown, red and yellow. Corundum is the most widely used of all natural abrasive materials.

Corundum is applied in the form of micropowder for polishing of glass, etc. Besides, crushed corundum is used for the manufacture of special grinding wheels intended for grinding of bearing balls.

ARTIFICIAL ABRASIVE MATERIALS

Owing to their great hardness and the uniformity of their chemical composition artificial abrasive materials represent the main raw material for the production of various kinds of modern grinding tools.

Artificial abrasive materials include different types of electrocorundum, silicon carbide and boron carbide.

Electrocorundum regular (symbol "Э")—is the most widely used abrasive material. Electrocorundum has much better cutting properties than natural corundum. It is a crystalline aluminium oxide mixed with a small amount of impurities. The hardness of electrocorundum is 9.05-9.1, and its specific gravity varies from 3.4 to 4.0 depending on the contents of crystalline aluminium oxide and impurities.



Figure 1 shows a lump of electrocorundum.
Great toughness of electrocorundum permits its successful use for grinding high tensile strength metals such as carbon and alloy steel (both soft and hardened), stellite, malleable iron, etc.

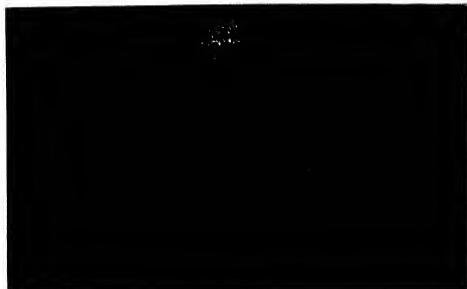


Fig. 1

Abrasives made of electrocorundum regular are widely used for roughing out of steel castings and forgings as well as for finishing various kinds of steel when they have to stand up to a high pressure under work.

Electrocorundum white (symbol "ЭБ")—has a higher content of crystalline aluminium oxide in comparison to electrocorundum regular. Figure 2 shows a lump of white electrocorundum.



Fig. 2

According to its chemical composition granulated electrocorundum white is divided into two groups—"ЭБ 99" and "ЭБ 97".

Abrasives made of electrocorundum white are widely used on all jobs calling for special accuracy, speed of cut and quality of finish, as for instance for sharpening of tools, internal grinding, surface grinding, cylindrical grinding,

thread grinding, etc. These abrasives are also used to particular advantage for finish grinding operations when it is necessary to have the least possible heat generation in the zone of grinding.

Monocorundum (symbol "М") is a new abrasive material consisting of crystalline aluminium free from slag impurities and having no pores. It is remarkable for its high strength and better cutting properties as compared to electrocorundum.

Grinding wheels made of monocorundum are used with great success on all kinds of grinding operations, i.e. surface grinding, external and internal cylindrical grinding, tool sharpening, etc.

Silicon carbide—is a combination of silicon and carbon. Silicon carbide has a greater hardness than electrocorundum (9.13–9.15).

Chemically pure silicon carbide is colourless and transparent. Industrial silicon carbide is of varying colours from light green to black depending on



Fig. 3

the composition and amount of impurities. The specific gravity of silicon carbide varies between 3.12 and 3.22 in accordance with the contents of iron oxide.

Silicon carbide is manufactured in two grades: green silicon carbide (symbol "ЛЗ") and black silicon carbide (symbol "ЛМ").

In respect to its properties black silicon carbide differs but slightly from green silicon carbide.

Figures 3 and 4 show lumps of green and black silicon carbide respectively. Owing to its high strength, great hardness, sharpness of grains as well as to its ability for forming coarse crystalline structure silicon carbide has found a wide field of application on various grinding jobs.

Since the grains of silicon carbide are more brittle than those of electrocorundum and are apt to break off under the pressure of tough and strong metal chips, silicon carbide wheels are mainly used for the grinding of low tensile strength metals such as grey cast iron, soft brass and bronze, copper and nearly all non-metal materials, i.e. wood, leather, glass, agate, corundum, marble, granite, porcelain, refractories, bones, etc.

Silicon carbide is also used for the manufacture of extra hard wheels, used for the dressing of grinding wheels as substitutes of commercial diamonds.



Abrasives made of green and black silicon carbide are widely used for sharpening of hard alloy tools. In addition to this, black silicon carbide is applied as a highly efficient refractory material and green silicon carbide is used for the manufacture of resistance rods for laboratory furnaces.

Boron carbide is produced in electric furnaces. The hardness of boron carbide is 9.6. Due to its great hardness it is applied for lapping of hard alloy tools as a substitute of diamond powder as well as for grinding of rubies, quartz, corundum, etc.

The specific gravity of boron carbide varies between 2.46 and 2.52 depending on the contents of free carbon.



Fig. 4

CLASSIFICATION OF ABRASIVE MATERIALS

In typical wheel manufacture the lumps of abrasive as they come from furnaces are broken by crushers into small pieces. Further, they are reduced to sizes suitable for grinding wheels or for other kind of abrasive—segments, sticks, mounting abrasive heads, etc. They are washed free of dust, are separated from impurities and are screened to a series of standard sizes (Fig. 5).

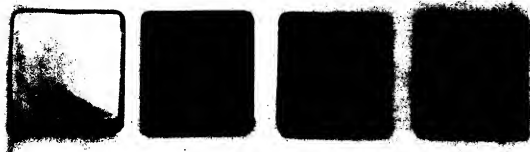


Fig. 5



For screening of abrasive grains and abrasive powders special machines are used whose screen cloths have meshes of different gauges varying from very coarse to fine ones. Very fine sizes of grain are separated by hydraulic flotation.

The size of the grain is indicated by the number of meshes per linear inch of the screen through which grain of this size falls while being retained on the screen of the next finer screen.

The sizes of grains in accordance with GOST 3238-46 are shown in Table 1.

Table 1

Grain size	Screened grains in microns	Grain size	Screened grains in microns
10	from 2300 to 2000	100	from 150 to 125
12	.. 2000 .. 1700	120	.. 125 .. 105
14	.. 1700 .. 1500	150	.. 105 .. 85
16	.. 1500 .. 1200	180	.. 85 .. 75
20	.. 1200 .. 1000	220	.. 75 .. 63
24	.. 850 .. 700	240	.. 63 .. 53
30	.. 700 .. 600	280	.. 53 .. 42
36	.. 600 .. 500	320	.. 42 .. 28
46	.. 420 .. 355	M28	.. 28 .. 20
54	.. 355 .. 300	M20	.. 20 .. 14
60	.. 300 .. 250	M14	.. 14 .. 10
70	.. 250 .. 210	M10	.. 10 .. 7
80	.. 210 .. 180	M7	.. 7 .. 5
90	.. 180 .. 150	M5	.. 5 .. 3.5

The first figure in microns is the mesh size of a screen through which grain particles fall, and the second figure—the mesh size of a screen, on which the grain particles are retained.

In accordance with GOST 3047-47 all abrasive materials depending on their grain sizes are divided into 3 groups as shown in Table 2.

Table 2

Grain groups	Grain size
Abrasive grains	10, 12, 14, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80 and 90
Abrasive powder	100, 120, 150, 180, 220, 240, 280 and 320
Abrasive micropowder	M 28, M 20, M 14, M 10, M 7 and M 5

Table 3 shows the most commonly used grain sizes for different kinds of abrasive materials.

Table 3

Abrasive materials	Group of grain	Grain size
Quartz	Abrasive grains	16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150, 180, 220, 240
Emery	Abrasive grains	10, 12, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90
Corundum	Micropowder	M 28, M 20, M 14, M 10, M 7



Contd.

Abrasive materials	Group of grain	Grain size
Electrocorundum regular	Abrasive grains	16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150, 180, 220, 240, 280, 320
	Micropowder	M 28, M 20, M 14, M 10, M 7
Electrocorundum white	Abrasive grains	36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150, 180, 220, 240, 280, 320
	Micropowder	M 28, M 20, M 14, M 10, M 7 and M 5
Monocorundum	Abrasive grains	24, 36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150
Silicon carbide black	Abrasive grains	12, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150, 180, 220
Silicon carbide green	Abrasive grains	36, 46, 54, 60, 70, 80, 90
	Abrasive powder	100, 120, 150, 180, 220, 240, 280, 320
	Micropowder	M 28, M 20, M 14 and M 10
Boron carbide	Abrasive powder	100, 120, 150, 180, 220, 240, 280, 320
	Micropowder	M 28

After granulating and screening the abrasive materials are packed up in the following manner:

- Abrasive grains and abrasive powder in 50 kg parcels.
- Micropowder in 40 kg parcels.



Fig. 6

This refers to all abrasives with the exception of boron carbide which is done up in 1 kg parcels.

The parcels are marked in accordance to the respective grain size.

Fig. 6 shows various tools made of abrasive materials, such as grinding wheels, abrasive points, abrasive sticks.



BONDING MATERIALS OF ABRASIVES

Bonding has the purpose of holding the abrasive particles together to give the wheel the necessary mechanical strength and the required grinding effect.

The bond must be able to resist the influence of cooling in "wet grinding" and must not be subject (within reasonable limits) to unfavourable influence from heat.

The following kinds of bonds are most commonly used in the manufacture of abrasives.

a) Anorganic: Ceramic bond, known in industry as vitrified; Mineral bond, known as magnesite.

b) Organic: Resinoid bond; Rubber bond.

Vitrified bond. In vitrified abrasives the bond is made up of feldspar, refractory clay, talc, etc. selected for their fusibility and carefully processed. Vitrified bond meets best the demand for proper and suitable embedding of the grains.

Since vitrified bonded wheels are very brittle, the application of vitrified bond in the manufacture of wheels of small width is very limited. As to other abrasive tools, more than 70% of same are made with vitrified bond.

Vitrified bonded wheels are widely used for internal grinding operations of ball and roller races, aircraft cylinders and for centerless internal grinding of piston rings. They are also extensively used for surface grinding operations accomplished with the periphery of the wheel on micrometer frames, gauge blocks and for centerless external grinding operations on different kinds of bushes, drills, gauges, ball and roller races, piston pins, pistons, valves, etc. Vitrified bonded wheels are also often used for external cylindrical grinding of camshafts, machine tool spindles and crankshafts, for sharpening different types of tools as well as for gear grinding and thread grinding operations. Vitrified bonded wheels are supplied for use at peripheral speeds from 30 up to 50 meters per second.

Magnesite bond. The magnesite bond has a very limited field of application in so far as it has a comparatively low strength and is liable to be attacked by grinding fluids.

Grinding wheels with magnesite bond are mainly used for surface grinding of file blanks. These wheels easily absorb water and may therefore lose their hardness if kept in a damp storage place. They should be stored in a dry place and 5-6 days before being mounted on a machine they have to be dried in special dryers at a temperature of 60-65° C (140-150° F).

Maximum peripheral speed for straight wheels with magnesite bond is 20 m per sec.

Resinoid bond. The resinoid bond is the most extensively used organic bond owing to the fact that abrasives made with this bond are distinguished by high strength, elasticity and a comparatively great hardness.

These properties permit to use the resinoid bonded wheels with high peripheral speeds from 30 to 50 m per sec and even up to 60 m per sec on thread grinding operations.

Owing to the above mentioned properties of the resinoid bond it may be used in the manufacture of wheels having a width of only 1 mm.

The resinoid bonded wheels are successfully used for such operations where it is important to have the least possible heat generation, i. e. finish grinding of camshafts, lapping of edges of different types of cutting tools, etc.



The resinoid bond is attacked by alkaline solutions such as soda, etc., which are used as coolant. Therefore the coolant applied with resinoid bonded wheels should not contain more than 1.5% of alkalines.

In order to minimize the injurious influence of alkaline fluids, the resinoid bonded wheels are often coated with sulphur, red lead or some other waterproof coating.

Abrasives with resinoid bond are mostly made of electrocorundum, monocorundum, black silicon carbide and very seldom of white electrocorundum and green silicon carbide.

Rubber bond. The rubber bond is distinguished by a high density and elasticity and is therefore extensively used for the manufacture of grinding wheels intended for finishing, polishing, cutting through and cutting off operations. Rubber and sulphur are the raw materials used for this kind of bond.

Owing to their dense structure the rubber bonded wheels are used on centreless grinding machines as grinding and regulating wheels.

Rubber bonded wheels may be made of a very small width, i. e. 0.5 mm while having a comparatively large diameter (125-150 mm).

Rubber bonded wheels are widely used for cutting off steel bars, grinding of steel bands, ball bearing races, cylindrical and taper rollers, piston pins, etc.

GRADE OF ABRASIVES

The grade otherwise known as "hardness" of an abrasive wheel is the strength with which the bonding material holds the abrasive particles together and keeps them from breaking out from the wheel in time of stress.

Wheels are marked according to their hardness by letters—from the softest "M" to the hardest "4T".

On Table 4 the grade scale of abrasive wheels in accordance to GOST 3751-47 is given.

Table 4

grade	Subdivisions of grade
M-soft	M 1, M 2, M 3
CM-medium soft	CM 1, CM 2
C-medium	C 1, C 2
CT-medium hard	CT 1, CT 2, CT 3
T-hard	T 1, T 2
BT-very hard	BT 1, BT 2
4T-extra hard	4T 1, 4T 2

Note. The ciphers 1, 2 and 3 shown in the column "Subdivisions of grade" designate the hardness of the abrasives in increasing sequence.

Depending upon the kind of bonds abrasives are made in the following grades:

- Vitrified bond—M3, CM4, CM2, C1, C2, CT1, CT2, CT3, T1, T2, BT1, BT2, 4T1 and rarely M1, M2 and 4T2;
- Resinoid bond—CM4, CM2, C1, C2, CT1, CT2, CT3 and T1;
- Rubber bond—CM, C, CT and T.

STRUCTURE OF ABRASIVES

Structure is the relationship of the abrasive grain to the bonding material and the relationship of these two elements to the spaces or voids that separate them. The precise relationship of these three elements can be controlled so that grinding wheels can be made dense or open, or in varying degrees of density or openness to suit grinding conditions.

According to varying manufacturing methods our structure scale ranges from "3"—the extremely dense, to "12"—the very open.

For each particular grinding job wheels of different structures are required. Thus, for example, for external cylindrical grinding wheels of structure "5" are used, for surface and internal grinding—wheels of structure "8", etc. Wheels having structures which vary from 5 to 8 are widely used for various grinding operations.

Nowadays for special grinding jobs superporous wheels of structures varying from "13" up to "18" are manufactured.

Superporous wheels have a high durability and provide adequate chip clearance and excellent cutting facilities, thus making it possible to use a higher wheel speed and cutting depth, than when using wheels of ordinary structures.

It should be remembered that when superporous wheels are used their grain size should be by 1-2 numbers finer than that of ordinary wheels. For example, when replacing an ordinary wheel with a grain size of 46 by a superporous one, the grain size of the latter should be 60 or 80.

WHEEL SHAPES AND SIZES

To meet the various requirements of industry wheels, segments, stones, blocks, mounted wheels and points shown on Tables 5-62 are made of different shapes and sizes in accordance with GOST. When ordering grinding wheels, segments, etc. the following details should be specified:

Quantity, GOST number, shape, dimensions.

STRAIGHT WHEELS

(Type "III", GOST 2424-52)

In accordance to GOST 2424-52 grinding wheels of straight shape are marked as type "III" (fig. 7).



Fig. 7



These wheels are remarkable for their strength and enjoy a wide field of application. All necessary data pertaining to these wheels are given in Tables 5-12.

Straight wheels up to 150 mm diameter having a width of 16 mm and over are mainly used for internal grinding.

For profile surface grinding of spline shafts wheels of 125 to 300 mm diameter are generally used.

Wheels of 175 to 450 mm in diameter and 16 to 40 mm in width are used for surface grinding operations.

For external grinding on machines of medium size wheels of 250 to 450 mm in diameter and 32-50 mm in width are required (fig. 8).

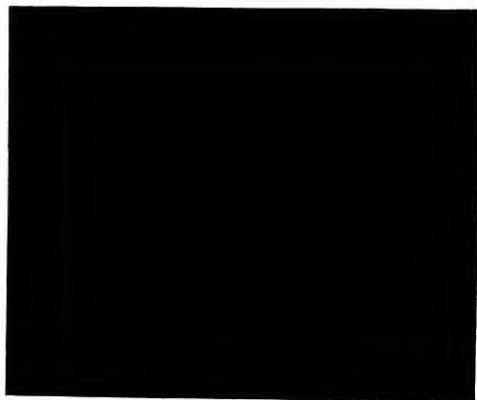


Fig. 8

For roll grinding straight wheels of 600 to 750 mm (sometimes even up to 900 mm) in diameter and 63 to 75 mm in width are used.

Wheels of 750 to 1100 mm in diameter and 32 to 127 mm in width are used for external grinding of crankshaft cheeks.

For centerless internal grinding wheels of 80 to 100 mm in diameter and 75 to 100 mm in width are generally used. Wheels of 250 to 600 mm in diameter and of 40 to 275 mm in width are used for centerless external grinding operations.

For surfacing work performed on portable grinders wheels of 100 to 250 mm in diameter and of 16 to 25 mm in width are mainly used. For the same operations, but performed on floor stands, wheels of 300 to 600 mm in diameter and 32 to 100 mm in width are used.

For tool sharpening operations wheels of 200 to 500 mm in diameter and 20-50 mm in width are used.



For internal thread grinding operations wheels of 80 to 150 mm in diameter and of 6 to 10 mm in width and for external thread grinding operations wheels of 250 to 500 mm in diameter and of 6 to 10 mm in width are generally used (fig. 9).



Fig. 9

Straight wheels, if necessary, can also be used as abrasive truing tools. For this purpose the wheels of 30 to 150 mm in diameter and 5 to 32 mm in width are used.

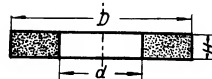


Table 5
Straight wheels for general grinding
(Type "III", GOST 2424-52)
Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	b	d			
1	2	3	4	5	6
3	8	1	0.0001	3	80
4	6	1.5	0.0001	3, 3B	60, 80
4	10	1.5	0.0002	3	80
5	8	2	0.0002	3, 3B	60, 80
6	6	2	0.0003	3	80
6	10	2	0.0004	3, 3B	60, 80
8	8	3	0.0007	3, 3B	60, 80
8	10	3	0.0010	3	60
8	13	3	0.0012	3	60
10	6	3	0.0010	3, 3B	60, 80
10	10	3	0.0016	3, 3B	60-100
10	13	3	0.0022	3, 3B	60, 80
12	6	4	0.0014	3, 3B	60, 80



Contd.

1	2	3	4	5	6
12	8	4	0.0019	0.0B	60, 80
12	16	4	0.0023	0.0B	60, 80
12	13	4	0.0030	0.0B	60, 80
12	16	4	0.0034	0.0B	60, 80
12	20	4	0.0046	0.0B	60, 80
12	32	4	0.0068	0	60
15	10	5	0.0036	0	46-80
15	16	5	0.0057	0.0B, 13	46-80
15	20	5	0.0072	0.0B	46-80
15	25	5	0.0090	0.0B	46-80
17	13	6	0.005	0	60
17	16	6	0.006	0.0B	46-80
17	20	6	0.009	0.0B	46-100
17	25	6	0.011	0.0B	46-80
20	8	6	0.005	0	46-60
20	10	6	0.006	0.0B	46-100
20	16	6	0.010	0.0B	46-100
20	20	6	0.012	0.0B, 13	46-100
20	25	6	0.016	0.0B	46-100
20	32	6	0.020	0.0B	46-100
25	6	6	0.006	0.0B	80
25	8	6	0.008	0	80
25	10	6	0.010	0.0B	60
25	13	6	0.014	0.0B	46-100
25	20	6	0.020	0.0B	46-100
25	25	6	0.025	0.0B	36-100
25	32	6	0.032	0.0B	36-100
30	10	10	0.014	0	46-60
30	13	10	0.019	0	46-60
30	16	10	0.023	0.0B	46-80
30	25	10	0.036	0.0B	46-80
30	32	10	0.046	0.0B	36-100
30	40	10	0.056	0.0B	46-80
35	16	10	0.032	0.0B	46-80
35	20	10	0.040	0	46-80
35	25	10	0.050	0.0B	46-80
35	32	10	0.064	0.0B	36-80
35	40	10	0.080	0.0B	46-80
35	50	10	0.100	0.0B	36-80
40	6	13	0.015	0	46-80
40	10	13	0.023	0	46-60
40	16	13	0.040	0	46-60
40	25	13	0.061	0.0B, 13	36-80
40	40	13	0.100	0.0B	46-80
40	32	16	0.080	0.0B	46-80
40	40	16	0.100	0.0B	46-80
40	50	16	0.120	0.0B	46-80
40	63	16	0.156	0	46-60
45	32	16	0.100	0.0B	46-80
45	40	16	0.120	0.0B	46-80
45	50	16	0.160	0.0B	46-80
50	6	13	0.025	0.0B	46-80
50	10	13	0.042	0.0B	46-60
50	16	13	0.067	0.0B	46-60
50	20	13	0.084	0.0B, 13	36-80
50	25	13	0.11	0.0B	36-80
50	32	16	0.14	0.0B	36-80
50	40	16	0.16	0.0B, 13, 13	46-80
50	50	16	0.20	0.0B	36-60
60	8	20	0.05	0	60
60	13	20	0.08	0.0B	46, 60



Contd.

1	2	3	4	5	6
60	20	20	0.12	0.0B	46-80
60	32	20	0.19	0.0B	36-80
60	50	20	0.29	0.0B	36-80
60	63	20	0.36	0.0B	36-80
70	6	20	0.05	0	46
70	10	20	0.08	0.0B	46-80
70	13	20	0.10	0.0B	36-80
70	16	20	0.13	0	46
70	25	20	0.20	0.0B	36-60
70	32	20	0.26	0.0B	36-80
70	50	20	0.40	0.0B	46-80
80	8	20	0.09	0.0B	46, 60
80	13	20	0.14	0	36, 46
80	20	20	0.21	0.0B	36-80
80	25	20	0.27	0	46-80
80	32	20	0.35	0.0B	46-80
80	40	20	0.44	0.0B	36-80
80	50	20	0.54	0.0B	36-80
80	63	20	0.69	0.0B	36, 46
80	100	20	1.09	0.13	46-80
90	10	20	0.14	0.0B	46-80
90	16	20	0.22	0	46
90	20	20	0.28	0	80
90	25	20	0.35	0.0B	36-80
90	32	20	0.44	0	46
90	50	20	0.70	0.0B	46-80
90	63	20	0.88	0.0B	36-60
100	6	20	0.10	0.0B	46-320
100	8	20	0.14	0.0B	36-240
100	10	20	0.17	0.0B	36-180
100	13	20	0.22	0.0B	36-120
100	16	20	0.27	0.0B	36-60
100	20	20	0.34	0.0B	36-80
100	25	20	0.43	0.0B	36-150
100	32	20	0.55	0.0B	16-80
100	40	20	0.70	0.0B	24-80
100	50	20	0.85	0.0B	24-80
100	63	20	1.07	0.0B	36-60
100	100	20	1.70	0.13	24, 36
110	8	20	0.17	0.0B	46-80
110	16	20	0.34	0	36, 46
110	20	20	0.42	0	36, 46
110	25	20	0.52	0	46
110	50	20	1.05	0.0B	36-80
125	6	32	0.16	0.0B	46-180
125	8	32	0.21	0.0B, 13	46-220
125	10	32	0.27	0.0B, 13	36-180
125	13	32	0.35	0.0B, 13	36-180
125	16	32	0.42	0.0B, 13	36-80
125	20	32	0.53	0.0B, 13, 13	24-120
125	25	32	0.66	0.0B, 13	24-80
125	32	32	0.85	0.0B, 13	24-150
125	50	32	1.32	0.0B, 13, 13	24-80
125	32	50	0.80	0	46, 60
125	50	50	1.25	0.0B, 13, 13	36-120
150	6	32	0.22	0.0B	36-220
150	10	32	0.37	0.0B, 13	36-220
150	13	32	0.48	0.0B, 13	36-120
150	16	32	0.60	0.0B, 13, 13	24-120
150	20	32	0.73	0.0B, 13, 13	24-120
150	25	32	0.92	0.0B, 13, 13	24-120



Contd.

1	2	3	4	5	6
150	32	32	1.29	0.0B	36-46
150	30	32	1.46	0.0B, I3	24-80
150	32	65	1.05	0.0B, I3, I4	24-80
150	50	65	1.65	0.0B, I4, I3	46-220
150	63	65	2.07	0.0B	36-80
175	10	32	0.53	0.0B	36-80
175	13	32	0.69	0.0B	36-80
175	16	32	0.83	0.0B, I4, I3	24-180
175	20	32	1.06	0.0B, I4, I3	24-120
175	25	32	1.32	0.0B, I4, I3	24-120
175	32	32	1.68	0.0B, I4	24-60
175	40	32	2.12	0.0B	36-60
200	6	32	0.43	0.0B	36-80
200	8	32	0.60	I3	46-60
200	10	32	0.71	0.0B, I3	36-80
200	13	32	0.92	0.0B, I3	36-80
200	16	32	1.20	0.0B, I4, I3	36-120
200	20	32	1.42	0.0B, I4, I3	24-120
200	25	32	1.77	0.0B, I4, I3	24-120
200	32	32	2.40	0.0B, I4, I3	24-100
200	20	75	1.24	0.0B, I3	36-60
200	25	75	1.55	0.0B, I3	46-60
200	32	75	1.98	0.0B, I3	24-46
200	63	75	3.80	0.0B	46-80
250	6	32	0.66	0.0B, I3	46-80
250	8	32	0.88	0.0B, I3	36-80
250	10	32	1.10	0.0B, I3	36-80
250	13	32	1.44	0.0B, I3	36-80
250	16	32	1.77	0.0B, I3	36-80
250	20	32	2.20	0.0B, I4, I3	36-80
250	25	32	2.75	0.0B, I4, I3	24-100
250	32	32	3.54	0.0B, I4, I3	24-80
250	10	75	1.02	0.0B	60-80
250	13	75	1.34	0.0B, I3	46-80
250	16	75	1.64	0.0B, I4, I3	46-80
250	20	75	2.04	0.0B, I4, I3	36-100
250	25	75	2.60	0.0B, I4, I3	24-120
250	32	75	3.28	0.0B, I4, I3	24-80
250	40	75	4.10	0.0B, I4, I3	24-60
250	50	75	5.12	0	36-60
250	63	75	6.45	0	36-60
250	6	127	0.51	0.0B	36-60
250	20	127	1.68	0.0B	36-60
300	20	75	3.02	0.0B, I4, I3	24-80
300	25	75	3.77	0.0B	24-80
300	32	75	4.83	0.0B, I4, I3	24-80
300	40	75	6.04	0.0B, I4, I3	16-46
300	50	75	7.54	0.0B	16-46
300	6	127	0.80	0B	46-180
300	8	127	1.06	0B	46-60
300	10	127	1.33	0.0B	36-120
300	13	127	1.72	0.0B, I3	36-100
300	16	127	2.12	0.0B, I3	36-100
300	20	127	2.66	0.0B, I3	24-100
300	25	127	3.30	0.0B, I4, I3	24-80
300	32	127	4.24	0.0B, I4, I3	24-100
300	40	127	5.32	0.0B, I4, I3	24-80
300	50	127	6.60	0.0B, I3	24-80
300	63	127	8.33	0	60-80
300	75	127	9.90	0	60-80
300	100	127	13.20	0.0B	46-60



Contd.

1	2	3	4	5	6
350	32	75	6.70	0	24-80
350	50	75	8.40	0.0B, I4, I3	16-80
350	50	75	10.30	0.0B	24-60
350	75	75	15.50	0	24-36
350	8	127	1.53	0.0B, I3	60-220
350	10	127	1.90	0.0B	60-80
350	13	127	2.48	0	46-80
350	16	127	3.06	0.0B	46-120
350	20	127	3.80	0.0B, I4, I3	24-60
350	25	127	4.75	0.0B	36-60
350	32	127	6.12	0.0B, I4, I3	24-80
350	50	127	7.61	0.0B, I4, I3	16-100
350	50	127	9.51	0.0B, I4, I3	24-100
350	63	127	12.20	0	36-46
400	16	127	4.16	0	36-80
400	20	127	5.20	0.0B, I3	24-80
400	25	127	6.50	0.0B	24-80
400	32	127	8.32	0.0B, I3	24-120
400	50	127	10.40	0.0B, I4, I3	24-100
400	50	127	13.00	0.0B, I4, I3	24-100
400	63	127	16.38	0.0B, I4, I3	24-80
400	13	203	2.80	0.0B	60-80
400	16	203	3.44	0.0B	60-80
400	20	203	4.40	0.0B	80
400	25	203	5.40	0.0B	16-60
400	32	203	6.48	0.0B	24-80
400	40	203	8.60	0.0B, I4, I3	24-80
400	50	203	10.80	0.0B, I4, I3	24-80
400	100	203	21.60	0	36-80
450	25	127	8.40	0.0B	24-60
450	50	127	13.40	0.0B	24-80
450	50	127	16.80	0.0B, I4	24-60
450	63	127	21.20	0.0B, I4	24-60
450	16	203	4.62	0	60
450	20	203	5.80	0.0B	16-80
450	25	203	7.25	0.0B	36-60
450	32	203	9.25	0	16-60
450	40	203	11.60	0.0B	24-60
450	50	203	14.50	0.0B, I4, I3	24-100
450	63	203	18.60	0.0B, I4	24-46
450	75	203	21.75	0	24-46
500	25	203	9.40	0	16-60
500	32	203	12.00	0	16-60
500	40	203	15.00	0.0B, I3	24-80
500	50	203	18.80	0.0B, I4, I3	24-80
500	63	203	23.80	0.0B, I4, I3	24-80
500	75	203	28.20	0	16-60
500	100	203	37.60	0	60
500	10	305	2.81	0B	100-220
500	13	305	3.70	0	46
500	16	305	4.54	0.0B	46-80
500	20	305	5.68	0.0B	46-100
500	25	305	7.10	0.0B	46-100
500	32	305	9.05	0.0B	46-80
500	40	305	11.20	0	36-80
500	50	305	14.20	0.0B, I4, I3	24-80
500	63	305	17.89	0.0B, I4, I3	24-80
500	75	305	21.30	0	24-60
500	100	305	28.40	0.0B	36-60
500	125	305	35.50	0.0B	36-60
500	150	305	42.60	0.0B, I3	36-100



Contd.

1	2	3	4	5	6
500	200	305	56.80	0	36-60
600	20	305	9.64	0	16-80
600	23	305	11.50	0, 015	60, 80
600	25	305	12.05	0	36-80
600	28	305	13.50	0	25-60
600	32	305	15.43	0, 015	36-80
600	38	305	16.80	0	16
600	40	305	19.28	0, 015	36-80
600	50	305	24.10	0	25-60
600	52	305	25.05	0	60
600	63	305	30.37	0, 015	25-60
600	75	305	36.15	0, 015	25-60
600	86	305	41.45	0	36-60
600	100	305	48.20	0	36-60
600	125	305	72.30	0, 015	36-80
600	130	305	62.66	0	36-60
600	150	305	72.30	0	36-60
600	200	305	96.40	0	25-60
650	33	305	19.63	0	16
650	38	305	22.60	0	16, 60
650	67	305	40.10	0	16, 60
750	25	305	21.20	0	16-80
750	28	305	23.80	0	16, 60
750	33	305	27.98	0	36-80
750	38	305	32.22	0	36-60
750	40	305	33.92	0	36-60
750	50	305	42.50	0	36-60
750	52	305	44.10	0	36-60
750	58	305	49.20	0	36-60
750	61	305	51.72	0	36-60
750	63	305	53.42	0	36-60
750	67	305	56.80	0	36-60
750	72	305	61.05	0	36-60
750	75	305	63.60	0, 015	36-60
750	78	305	66.15	0	16, 60
750	82	305	69.54	0	16
750	86	305	72.93	0	36, 46
750	100	305	84.80	0	36-60
750	130	305	110.24	0	36-60
900	33	305	18.73	0	36-60
900	40	305	24.80	0	36-60
900	43	305	25.70	0	16, 60
900	50	305	33.60	0	36-60
900	52	305	35.34	0	36-60
900	58	305	40.10	0	36-60
900	61	305	42.00	0	36-60
900	63	305	43.58	0	36-60
900	72	305	53.00	0	36-60
900	75	305	56.00	0	16, 60
900	78	305	58.00	0, 015	36-80
900	82	305	60.20	0	36
900	90	305	66.10	0	16
900	100	305	72.00	0	60
1100	33	305	16.00	0	60
1100	40	305	20.01	0	60
1100	43	305	21.07	0	60
1100	72	305	144.03	0	36-46
1100	82	305	164.10	0	36-46
1100	90	305	180.10	015	60



Table 6
Straight wheels for thread grinding
(single rib method)
(Type "III", GOST 2424-52)
Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
100	6	20	0.10	015	120-320
100	8	20	0.14	015	120-250
150	6	32	0.22	015	120-320
400	8	203	1.72	015	180-320
400	10	203	2.15	015	180-320
450	8	203	2.33	015, 133	150-320
450	10	203	2.90	015	150-280



Table 7
Straight wheels for thread grinding
(multi-rib method)
(Type "III", GOST 2424-52)
Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
100	50	20	0.85	015, 133	220-280
100	63	20	1.07	015	180-220
150	50	65	1.85	015, 133	120-230
400	50	127	13.00	015	120-180
400	25	203	7.28	015	120-180

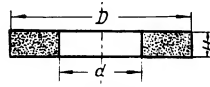


Table 8
Straight wheels for grinding balls
(Type "III", GOST 2424-52)
Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
600	100	290	60-63	0, 133	220 and finer
800	100	290	120-125	0, 133	220





Table 9
Straight wheels for truing grinding wheels
(Type "III", GOST 2424-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
60	20	20	0.11	KV	12-36
70	32	20	0.25	KV	16-36
80	20	20	0.21	KV	16-36
80	32	20	0.33	KV	24
80	50	20	0.41	KV	24
80	32	32	0.30	KV	24
100	20	20	0.33	KV	16, 24
100	25	20	0.42	KV	24
100	32	20	0.55	KV	16-36
100	50	20	0.67	KV	16, 24
125	20	32	0.54	KV	24
125	25	32	0.65	KV	24, 36
125	32	32	0.80	KV	16-36
125	32	50	0.72	KV	16-36
150	32	32	1.15	KV	24
150	50	32	1.50	KV	24
150	32	65	1.00	KV	12-24

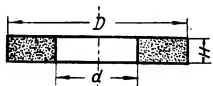


Table 10
Straight wheels for general grinding
(Type "III", GOST 2424-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
100	6	20	0.14	Q	36
100	8	20	0.16	Q	36
100	10	20	0.20	Q	36
100	16	20	0.31	Q	36
100	20	20	0.39	Q	24, 36
100	25	20	0.49	Q	16, 24
100	32	20	0.63	Q	24, 36
125	6	32	0.18	Q	60
125	8	32	0.24	Q	36-80
125	10	32	0.30	Q	36-80
125	16	32	0.47	Q	24-60
125	20	32	0.59	Q, KV	24-60
125	25	32	0.75	Q	24-60
125	32	32	0.95	Q	24-60
125	50	32	1.50	KV	16
150	6	32	0.26	Q	46-60
150	10	32	0.44	Q	24-60
150	13	32	0.57	Q	46-60
150	16	32	0.70	Q	24-60
150	20	32	0.88	Q, KV	24, 36
150	25	32	1.10	Q, KV	24-60



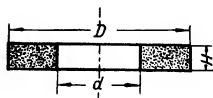
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1	2	3	4	5	6
150	32	32	1.4	Q	36
175	6	32	0.36	Q	36-60
175	10	32	0.60	Q	36, 46
175	13	32	0.78	Q	36, 46
175	16	32	0.97	Q	36-60
175	20	32	1.21	Q, KV	24-46
175	25	32	1.51	Q	24
175	50	32	3.02	Q	24-36
200	6	32	0.48	Q	36, 46
200	10	32	0.80	Q	24-60
200	16	32	1.28	Q, KV	24-60
200	20	32	1.60	Q, KV	24-60
200	25	32	2.00	Q, KV	24-60
200	50	75	3.19	Q	36
200	50	75	4.00	Q	36, 46
200	63	75	4.90	Q	36
200	75	75	6.00	Q	36
250	6	32	0.75	Q	36
250	8	32	1.00	Q	24-46
250	10	32	1.26	Q	24-46
250	13	32	1.63	Q	24-60
250	16	32	2.00	Q, KV	24-60
250	20	32	2.51	Q, KV	24-46
250	25	32	3.15	Q, KV	24-60
250	32	32	4.01	Q	36
250	50	32	6.28	Q	24
250	20	75	2.32	Q	24, 36
250	25	75	2.90	Q	24-46
250	32	75	3.75	Q	36
250	40	75	4.64	Q, KV	16-60
250	63	75	7.32	Q	46-80
300	20	75	3.45	Q	24
300	25	75	4.30	Q, KV	24, 36
300	32	75	5.51	Q, KV	24, 36
300	40	75	6.90	Q, KV	12-46
300	50	75	8.62	Q	16, 24
300	6	127	0.91	Q	36
300	8	127	1.21	Q	36, 46
300	10	127	1.51	Q	36
300	13	127	1.96	Q	24-46
300	20	127	3.02	Q, KV	36-80
300	25	127	3.77	Q, KV	36-80
300	32	127	4.83	Q, KV	24, 36
300	40	127	6.03	Q, KV	16-46
300	50	127	7.54	Q, KV	24-46
300	63	127	9.50	Q	80
300	75	127	11.31	Q	36
350	32	127	7.74	Q, KV	16-36
350	40	127	9.55	Q, KV	16-36
350	50	127	11.70	Q, KV	16-36
350	25	127	5.53	Q	24, 36
350	32	127	6.95	Q	24, 36
350	40	127	8.68	Q, KV	16-36
350	50	127	10.86	Q, KV	16-36
400	16	127	4.70	Q	24
400	20	127	5.88	Q	16
400	40	127	11.75	Q, KV	16-46
400	50	127	14.69	Q, KV	16-36
400	63	127	18.51	Q	80
400	13	203	3.13	Q	60
400	16	203	3.88	Q	60
400	25	203	6.06	Q	60



Condt.

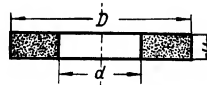
1	2	3	4	5	6
400	32	203	7.76	3	36
400	40	203	9.70	3, IV	16-36
400	50	203	12.13	3, IV	16-36
450	40	127	15.22	3, IV	12-36
450	50	127	19.03	3, IV	12-36
450	63	127	24.00	3, IV	12-24
450	40	203	13.18	3	60
450	50	203	16.48	3	16, 24
450	63	203	20.76	3	24, 36
500	25	203	10.74	3	24
500	40	203	17.05	3	12-36
500	50	203	21.32	3, IV	12-46
500	63	203	26.86	3, IV	12-46
500	75	203	31.98	3, IV	12-46
500	16	305	5.13	3	60
500	20	305	6.41	3	60
500	25	305	8.01	3	60
500	63	305	20.20	3, IV	12-36
500	75	305	24.05	3, IV	12-36
500	100	305	32.05	3	36-80
500	125	305	40.07	3	25-60
500	150	305	48.08	3	24-80
600	25	305	13.63	3	24-60
600	32	305	17.85	3	60
600	40	305	21.81	3	60
600	50	305	27.26	3, IV	16-46
600	63	305	34.35	3, IV	12-46
600	75	305	40.90	3, IV	12-46
600	100	305	54.52	3, IV	24-80
600	125	305	68.15	3	36-60
600	150	305	81.77	3	36-60
750	40	305	38.35	3	24
750	63	305	60.49	3	60
750	75	305	71.89	3, IV	24-60
900	40	305	56.57	3, IV	36-60
900	50	305	70.72	3, IV	60-220
900	75	305	106.07	3, IV	60-220
900	100	305	141.13	3	36

Table 11
Straight wheels for peripheral speed up to 50 m per sec.

(Type "III", GOST 2424-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
300	40	75	6.90	3, IV	16, 24
350	40	75	9.55	3, IV	16, 24
400	40	127	11.75	3, IV	16, 24
400	50	203	12.13	3, IV	16, 24
500	50	203	21.32	3, IV	16, 24
500	63	203	26.86	3, IV	16, 24
500	75	203	31.98	3, IV	16, 24
600	50	203	32.53	3, IV	12-24
600	75	203	48.80	3, IV	12-24
600	63	305	34.35	3, IV	12-24
600	75	305	40.90	3, IV	12-24

Table 12
Straight wheels for general grinding
(Type "III", GOST 2424-52)

Rubber bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
60	13	20	0.09	3	80, 100
60	16	20	0.11	3	100
70	6	20	0.06	3	80
70	10	20	0.10	3	100
70	13	20	0.13	3	100
70	16	20	0.15	3	100
70	20	20	0.20	3	80-120
80	13	20	0.17	3	80-150
80	14	20	0.18	3	100
80	16	20	0.21	3	100
80	18	20	0.24	3	100
90	14	20	0.24	3	100
90	20	20	0.34	3	100
90	23	20	0.48	3	80
100	6	20	0.12	3	80, 100
100	8	20	0.16	3	80, 100
100	10	20	0.21	3	80, 100
100	13	20	0.27	3	100-150
100	16	20	0.33	3	80, 100
100	20	20	0.42	3	80-150
100	23	20	0.58	3	100
100	25	20	0.52	3	80, 100
100	32	20	0.67	3	80, 100
100	40	20	0.84	3	80
110	16	20	0.41	3	100
110	20	20	0.51	3	80
125	6	32	0.19	3	60, 100, 220
125	8	32	0.26	3	60-100
125	10	32	0.30	3	60-100
125	13	32	0.38	3	80-120
125	16	32	0.52	3	80
125	18	32	0.54	3	80
125	20	32	0.60	3	80
125	23	32	0.77	3	80, 100
125	25	32	0.80	3	80
125	28	32	0.53	3	80, 100
125	32	32	1.03	3	80
125	50	32	1.50	3	80
150	6	32	0.28	3	60
150	10	32	0.47	3	60, 80
150	13	32	0.61	3	80
150	16	32	0.75	3	100
150	20	32	0.94	3	80
150	25	32	1.18	3	80
150	32	32	1.51	3	80
200	75	75	5.67	3	80
200	200	75	15.12	3	80, 100
250	6	75	0.62	3	80, 100
250	10	75	1.24	3	80, 100
250	100	127	10.19	3	80, 100
300	6	127	0.97	3	80-220



Contd.

1	2	3	4	5	6
300	8	127	1.30	○	80—220
300	10	127	1.62	○	80—220
300	13	127	2.11	○	100—220
300	16	127	2.60	○	100—150
300	20	127	3.25	○	66—150
300	25	127	4.06	○	80, 100
300	32	127	5.20	○	80
300	40	127	6.50	○	100
300	50	127	8.12	○	80
300	63	127	10.23	○	80
300	75	127	12.18	○	80
300	100	127	16.25	○	60
350	8	127	1.87	○	100
350	10	127	2.33	○	100
350	13	127	3.04	○	100
350	16	127	3.74	○	100
350	20	127	4.67	○	100
350	25	127	5.85	○	80
350	32	127	7.48	○	80
350	40	127	9.35	○	60
350	100	127	23.38	○	60, 100
400	6	203	1.56	○	120
400	8	203	2.09	○	80, 100
400	10	203	2.61	○	80
400	13	203	3.39	○	80, 100
400	16	203	4.19	○	80, 100
400	18	203	4.70	○	80, 100
400	20	203	5.22	○	80, 100
400	23	203	5.98	○	80, 100
400	25	203	6.53	○	80, 100
400	28	203	7.28	○	80, 100
400	32	203	8.36	○	80, 100
400	100	203	45.98	○	60—120
500	13	305	4.49	○	80
500	16	305	5.52	○	80
500	20	305	6.90	○	100
500	25	305	8.63	○	100
500	32	305	11.04	○	100, 120
500	40	305	13.81	○	100, 120
500	50	305	17.26	○	100, 120
500	63	305	21.75	○	120
500	75	305	25.89	○	60
500	150	305	51.78	○	60—120
500	200	305	69.05	○	60
600	150	305	88.06	○	60

GRINDING WHEELS TAPERED TWO SIDES

(Type "2H", GOST 2424-52)

The type "2H" wheels represent a variety of straight wheels having a tapered profile of 40 or 60°. They are mainly used for gear grinding operations and for the grinding of threads when the single rib method is used.

All necessary data are given in Table 13.



Table 13
Wheels tapered two sides
(Type "2H", GOST 2424-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	a	α°			
250	10	75	4	40	0.97	ЭБ, 133	46, 60
250	13	75	4	40	1.25	ЭБ, 133	46—80
250	16	75	4	40	1.55	ЭБ, 133	46—80
250	20	75	6	40	1.85	ЭБ	46
250	25	75	6	40	2.42	ЭБ	46
300	25	127	6	40	3.40	ЭБ	46
350	32	127	8	40	4.35	ЭБ	46
450	8	229	3	60	2.33	ЭБ	46, 60
450	10	229	3	60	2.91	ЭБ	46, 60
500	10	254	2	60	2.84	ЭБ	46, 60

GRINDING WHEELS TAPERED ONE SIDE

(Type "3H", GOST 2424-52)

The type "3H" wheels (fig. 10) are widely used for sharpening different kinds of saws.

All necessary data are given in Table 14.

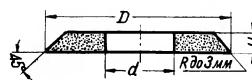


Table 14
Wheels tapered one side
(Type "3H", GOST 2424-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	a	α°			
250	6	75			0.90	Э	36, 46
250	8	75			1.20	Э	36, 46
250	10	75			1.50	Э	36, 46
300	6	75			1.00	Э	36, 46
300	8	75			1.30	Э	36, 46
300	10	75			1.60	Э	36, 46
300	8	127			1.45	Э	36, 46
300	10	127			1.40	Э	36, 46
300	13	127			1.82	Э	36, 46



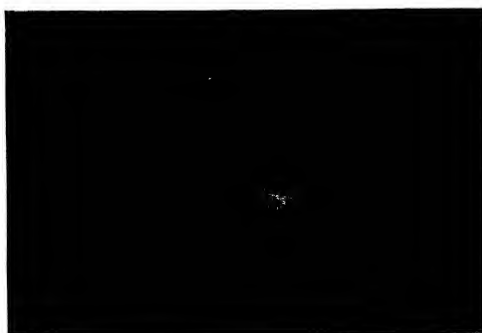


Fig. 10



Fig. 11



GRINDING WHEELS TAPERED ONE SIDE

(Type "4 II", GOST 2424-52)

The type "4 II" wheels (fig. 11) up to 250 mm in diameter are used for tooth sharpening on different kinds of milling cutters, reamers and other types of small tools. Wheels of 300 up to 350 mm in diameter are usually applied for grinding shaper cutters.

All necessary data for type "4 II" are given in Tables 15 and 16.

Table 15

Wheels tapered one side
(Type "4 II", GOST 2424-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	a	α°			
75	6	13	2	10	0.04	3B	60, 80
100	6	20	2	10	0.075	3B, 13	60, 80
125	8	32	2	10	0.15	3B, 13	46-80
150	8	32	2	10	0.215	3B, 13	46-80
175	10	32	3	10	0.36	3B, 13	46-80
200	13	32	3	10	0.60	3B, 13	46, 60
250	16	32	3	10	1.06	3B	46-80
300	13	127	3	15	1.35	3B	46-100
350	25	127	4	30	3.90	3B	80

Table 16

Wheels tapered one side
(Type "4 II", GOST 2424-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	a	α°			
125	8	32	2	10	0.17	3	36
150	8	32	2	10	0.24	3	36
175	10	32	3	10	0.40	3	46



GRINDING WHEELS RECESSED ONE SIDE

(Type "IIB", GOST 2424-52)

The type "IIB" wheels (fig. 12) are made up to 600 mm in diameter. Wheels having diameters from 10 to 150 mm are generally used for internal

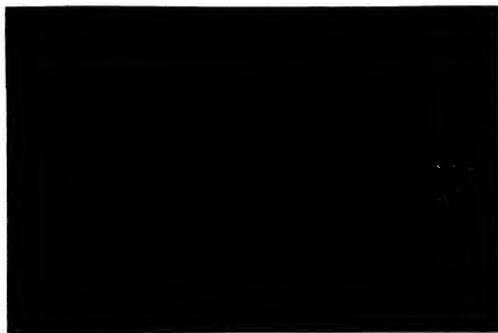
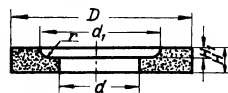


Fig. 12

grinding operations when it is necessary to grind hole and its adjacent face simultaneously at one setting. This type of grinding wheel is also used for surface grinding operations.

Wheels of 300 to 500 mm in diameter are used for external cylindrical grinding operations.

All necessary data for this type of wheels are shown in Table 17.



Wheels recessed one side
(Type "IIB" GOST 2424-52)

Vitrified bond

Table 17

Dimensions, mm						Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	r			
1	2	3	4	5	6	7	8	9
10	6	3	5	3	0.25	0.0009	3	56-80
10	13	3	5	6	0.25	0.0020	3	56-60
12	10	4	6	5	0.5	0.0020	3	56-80
12	16	4	6	8	0.5	0.0040	3	56-60
15	8	5	8	4	0.5	0.0030	3, 3B	56-60
15	13	5	8	6	0.5	0.004	3	56-60
15	20	5	8	10	0.5	0.007	3, 3B	56-60

Contd.

1	2	3	4	5	6	7	8	9
20	10	6	10	5	1	0.006	3	56
20	16	6	10	8	1	0.060	3, 3B	56-80
20	25	6	10	13	1	0.015	3, 3B	56-60
25	13	6	13	6	1	0.014	3	56
25	20	6	13	10	1	0.019	3, 3B	56-60
25	25	6	13	13	1	0.023	3, 3B	60
30	16	10	16	8	1	0.020	3	56
30	25	10	16	13	1	0.032	3	56-80
30	32	10	16	16	1	0.040	3	56-60
35	25	10	20	13	1	0.043	3	56-80
35	32	10	20	16	1	0.056	3, 3B	56-80
40	25	13	20	13	1	0.059	3, 3B	56-60
40	40	13	20	20	1	0.097	3, 3B	56-80
50	25	13	25	13	1	0.095	3	56-60
50	40	13	25	20	1	0.150	3, 3B, 133	56-60
60	32	20	32	16	1	0.165	3	56
60	50	20	32	30	1	0.25	3, 3B	36-80
70	25	20	40	13	1	0.17	3	56-60
70	40	20	40	20	1	0.28	3, 3B	56-60
80	32	20	40	16	1	0.31	3, 3B	36-60
80	40	20	40	20	1	0.39	3	60
90	25	20	40	13	1	0.32	3	36-60
90	63	20	40	30	1	0.81	3, 3B	56-60
100	32	20	50	16	1.5	0.49	3	56-60
100	40	20	50	20	1.5	0.60	3	56-60
100	50	20	50	30	1.5	0.75	3, 3B	36-60
110	25	32	65	13	1.5	0.48	3	56
110	40	32	65	20	1.5	0.68	3, 3B	56-60
125	32	32	65	16	1.5	0.75	3, 3B	36-60
125	50	32	65	30	1.5	1.14	3, 3B	36-60
150	32	32	85	16	2	1.06	3, 3B	36-60
175	32	32	100	16	2	1.44	3, 3B	56-60
200	32	75	125	16	2	1.70	3	56-60
200	40	75	125	20	2	2.10	3, 3B, 133	56
250	40	75	125	20	3	3.47	3, 3B	56-60
300	40	127	175	20	3	4.48	3	56-60
300	50	127	175	30	3	5.50	3, 3B, 133	56-80
300	63	127	200	30	3	7.00	3	80
350	40	127	200	20	3	6.80	3, 3B, 133	56-80
350	50	127	200	30	3	8.50	3, 3B, 133	60
400	40	127	200	20	5	9.53	3	60
400	50	127	200	25	5	9.40	3, 3B	36-60
450	63	203	265	30	5	11.80	3, 133	36-60
500	50	203	265	25	5	17.50	3, 3B	60-80
500	63	203	265	30	5	22.20	3, 3B	56-60
500	63	305	375	30	5	15.28	3	36-46
500	75	305	375	35	5	18.25	3	60
500	100	305	375	25	5	26.20	3	60
600	75	305	375	35	6	34.00	3	36-46

GRINDING WHEELS RECESSED ONE SIDE WITH BEVELED FACE
(Type "IIBK", GOST 2424-52)

The type "IIBK" grinding wheels (fig. 13) are designed for various external cylindrical grinding operations where external diameter and shoulder of the part are to be ground simultaneously.

Table 18 gives all the necessary dimensions for this type of wheels.



Table 18
Wheels recessed one side with beveled face
(Type "ИБН", GOST 2424-52)
Vitrified bond

Dimensions, mm							Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	a°	r			
350	50	127	265	25	20	3	5.03	Э	36, 46
500	50	203	375	25	15	4	13.70	Э	36, 46
600	75	305	375	35	10	5	29.44	Э	36-60
750	75	305	500	35	10	5	47.84	Э	36, 46

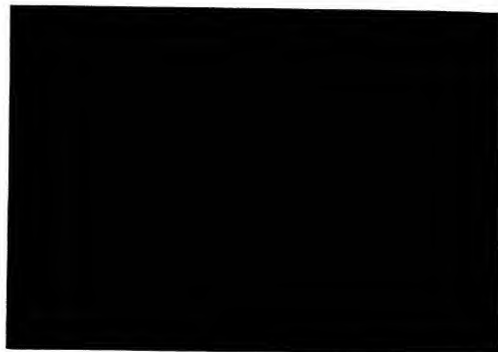


Fig. 13

GRINDING WHEELS RECESSED TWO SIDES

(Type "ИБД", GOST 2424-52)

The type "ИБД" wheel is mainly used for cutter sharpening and external cylindrical grinding operations.

This type of wheel can also be used for centerless grinding operations and serves as a regulating or grinding wheel on centerless grinding machines.

All necessary data for this type of wheels are given in Tables 19-23.



Table 19
Wheels recessed two sides
(Type "ИБД", GOST 2424-52)
Vitrified bond

Dimensions, mm							Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	d ₂	H ₂			
250	75	75	150	25	25	3	6.68	Э	46, 60
300	50	127	200	13	13	3	5.55	Э, 13	46
350	75	127	250	25	25	3	10.23	Э, 13, 13	36-80
350	100	127	200	25	25	3	17.95	Э	46
400	50	203	265	13	13	5	9.36	Э, 13, 13	36-80
450	50	203	265	13	13	5	13.20	Э, 13, 13	36-80
500	63	203	265	16	16	5	22.05	Э, 13, 13	36-80
500	75	203	265	16	16	5	26.68	Э	46
500	86	305	375	20	20	5	20.94	Э	46
600	50	305	375	13	13	6	21.87	Э	36-60
600	58	305	375	13	13	6	25.73	Э	46, 60
600	63	305	375	16	16	6	27.62	Э, 13	36-60
600	75	305	375	16	16	6	33.50	Э	36-60
600	78	305	375	20	20	6	34.17	Э	36
600	100	305	375	25	25	6	43.92	Э	46
600	110	305	375	25	25	6	48.75	Э	46
650	50	305	375	13	13	6	27.52	Э	46
650	75	305	375	16	16	6	37.13	Э	36, 46
750	63	305	375	16	16	6	50.68	Э	36-60
750	75	305	375	16	16	6	60.93	Э	36-60
750	78	305	375	20	20	6	63.18	Э	46, 60
750	82	305	375	20	20	6	66.42	Э	46, 60
750	86	305	375	20	20	6	69.48	Э	36-60
750	113	305	375	25	25	6	91.44	Э	36, 46
750	130	305	375	25	25	6	105.30	Э	36, 46
900	63	305	375	16	16	6	83.40	Э	36, 46
900	75	305	375	16	16	6	94.47	Э	36, 46
900	90	305	375	20	20	6	115.80	Э	36, 46
900	100	305	375	20	20	6	129.80	Э	36, 46



Table 20
Wheels recessed two sides for centerless grinding
machines (regulating wheels)
(Type "ИБД", GOST 2424-52)
Rubber bond

Dimensions, mm							Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	d ₂	H ₂			
300	100	127	200	13	13	3	14.62	Э	80-120
300	150	127	200	40	35	3	19.95	Э	80-120
300	200	127	200	40	85	3	25.45	Э	80-120
350	150	127	200	20	20	3	31.2	Э	80-120
350	200	127	200	40	50	3	40.5	Э	80-120
350	275	127	200	65	100	3	54.9	Э	80-120





Table 21
Wheels recessed two sides for centerless grinding machines (regulating wheels)
(Type "IIB₂L", GOST 2424-52)

Resinoid bond

Dimensions, mm								Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	H ₂	r				
300	100	127	200	13	13	3	13.66	3	3	80, 100
300	150	127	200	40	35	3	18.30	3	3	80, 100
300	200	127	200	40	85	3	23.35	3	3	80, 100
350	150	127	200	20	20	3	28.60	3	3	80, 100
350	200	127	200	40	50	3	38.06	3	3	80, 100

GRINDING WHEELS RECESSED TWO SIDES WITH BEVELED FACE

(Type "IIB₂LK", GOST 2424-52)

The type "IIB₂LK" wheels are mainly used for external cylindrical grinding when it is necessary to grind the external diameter and the two adjacent shoulders of the job from both sides at one setting.

All dimensions for this type of wheels are given in Table 22.



Table 22
Wheels recessed two sides with beveled face
(Type "IIB₂LK", GOST 2424-52)

Vitrified bond

Dimensions, mm								Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	v	r				
600	75	305	375	20	7	5	27.60	3	3	36-60
750	75	305	500	16	5	5	48.80	3	3	60

CORRUGATED STRAIGHT WHEELS

(Type "IIP", GOST 2424-52)

The type "IIP" are mainly used for preliminary rough grinding operations. Wheels of this type having a diameter of 500 to 750 mm are made of one piece and wheels of 1340 mm in diameter consist of six segments.

All necessary data for this type of wheels are given in Table 23.



Table 23
Corrugated straight wheels
(Type "IIP", GOST 2424-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
500	16	50	7.85	3, R ₄	16, 24
500	16	150	7.20	3, R ₄	16, 24
500	16	203	6.90	3, R ₄	16, 24
585	16	150	10.00	3	24
650	16	150	11.54	3, R ₄	16, 24
750	16	203	16.70	3	16, 24
1340	16	250	55.00	3, R ₄	16, 24

STRAIGHT STEELBACKED DISC WHEELS

(Type "IIIH", GOST 2424-52)

The type "IIIH" wheel is a bonded abrasive wheel vulcanized or cemented to a steel disc. The steel disc serves as a frame for the abrasive and at the same time as a means for mounting the disc wheel on the driving plate of the machine.

Disc wheels of 500 to 750 mm in diameter are made of one piece, while disc wheels of 1340 mm in diameter are assembled of 4 to 6 segments cemented together along radial lines.

All dimensions for this type of wheels are given in Table 24.

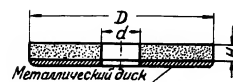


Table 24
Straight steelbacked disc wheels
(Type "IIIH", GOST 2424-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
500	40	50	19.80	3, R ₄	16, 24
500	40	203	16.50	3	36
500	60	203	21.80	3	24-46
500	40	305	10.80	3, R ₄	24
585	40	50	27.00	3, R ₄	16, 24
585	40	203	23.90	3	80
585	60	203	35.80	R ₄	60, 80
650	40	50	34.00	R ₄	16, 24
750	40	50	43.9	R ₄	16-60
750	40	150	43.00	3	36
750	40	350	35.9	3, R ₄	36-80
750	60	350	53.8	R ₄	24
1340	40	203	144.0	3, R ₄	16, 24

Notes.

1. To avoid any possibility of error, the steel discs are to be submitted to the supplier.
2. On special request the type "IIIH" wheels can be supplied with inserted nuts by means of which the wheels are attached to the driving plate of the machine.



CUTTING-OFF WHEELS

(Type "Д", GOST 2424-52)

The type "Д" cutting-off wheels (fig. 14) are a variety of the type "III" straight wheels but having a width of 0.5 mm up to 5 mm. The type "Д" cutting-off wheels are mainly used for cutting off different structural shapes of steel, tungsten bars, steel tubes, glass, refractory bricks, quartz and ceramic plates and other kind of materials.

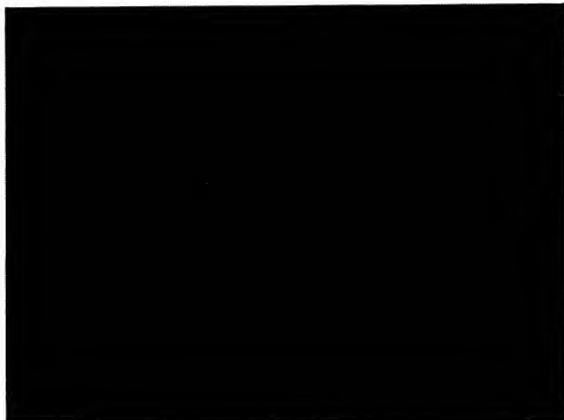


Fig. 14

The type "Д" cutting-off wheels facilitate quick and economic cutting and the abrasive cut-off machine competes with the shear and saw. The type "Д" cutting-off wheels have to work at a speed of 50 m per sec.

All dimensions for this type of wheel are given in Tables 25-26.



Cutting-off wheels
(Type "Д", GOST 2424-52)
Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
80	3.0	20	0.036	Д	46
100	1.5	20	0.027	Д	46-80
100	3.0	20	0.038	Д	60
100	3.5	20	0.047	Д	80



Contd.

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
100	3.0	20	0.057	Д	46-80
100	5.0	20	0.094	Д	46-80
125	1.5	20	0.046	Д	36-80
125	2.0	20	0.061	Д	60, 80
125	2.5	20	0.077	Д	60, 80
125	3.0	20	0.093	Д	46-80
150	1.5	32	0.062	Д	46-80
150	2.0	32	0.083	Д	36-60
150	3.0	32	0.126	Д	46-80
150	4.0	32	0.168	Д	46-80
175	1.5	32	0.10	Д	46-80
175	2.0	32	0.14	Д	36-80
175	2.5	32	0.17	Д	80
175	3.0	32	0.20	Д	80
175	4.0	32	0.28	Д	46-80
200	1.5	32	0.12	Д	46-80
200	2.0	32	0.16	Д	36-80
200	3.0	32	0.24	Д	36-80
250	1.5	32	0.19	Д	80
250	2.0	32	0.24	Д	46-80
250	3.0	32	0.36	Д	36-80
300	2.0	32	0.36	Д	36-80
300	2.5	32	0.44	Д	36-80
300	3.0	32	0.48	Д	36-80
400	3.0	32	0.80	Д, КМ	24-60
400	3.5	32	0.95	КМ	16, 24
500	4.0	32	1.00	Д, КМ	16-60
500	4.0	32	1.45	Д	36, 46



Cutting-off wheels
(Type "Д", GOST 2424-52)
Rubber bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
80	1.0	20	0.013	Д	80-120
80	3.0	20	0.040	Д	60, 80
100	0.5	20	0.10	Д	100
100	0.75	20	0.015	Д	80, 100
100	1.0	20	0.02	Д	60-120
100	1.5	20	0.03	Д	60-100
100	2.0	20	0.04	Д	60-100
100	3.0	20	0.06	Д	46-80
100	5.0	20	0.10	Д	46-80
125	0.5	20	0.017	Д	60-120
125	1.0	20	0.035	Д	60-120
125	1.5	20	0.052	Д	60-100
125	2.0	20	0.07	Д	46-100
125	2.5	20	0.087	Д	46-80
125	3.0	20	0.104	Д	46-80
125	5.0	20	0.174	Д	46-80
150	0.75	32	0.033	Д	100, 120
150	1.0	32	0.045	Д	60-120



Contd.

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
150	1.5	32	0.066	Э	60—100
150	2.0	32	0.090	Э, КЭ	46—100
150	3.0	32	0.132	Э, КЭ	46—120
150	4.0	32	0.180	Э	46—80
175	1.0	32	0.08	Э	60—100
175	2.0	32	0.16	Э	46—100
175	4.0	32	0.32	Э	60, 80
200	1.0	32	0.09	Э	60—100
200	1.5	32	0.14	Э	46—80
200	2.0	32	0.18	Э	46—80
200	3.0	32	0.28	Э	46—80
250	2.0	32	0.26	Э	46—80
250	3.0	32	0.39	Э	46—80
300	2.0	32	0.40	Э	60, 80
300	2.5	32	0.50	Э	46—80
300	3.0	32	0.60	Э	36—80
400	3.0	32	0.88	Э	46, 60
400	4.0	32	1.10	Э	46, 60

CYLINDER GRINDING WHEELS

(Type "1 K" and "2 K", GOST 2424-52)

Cylinder grinding wheels type "1 K" (fig. 15) are straight wheels having a relatively large width and a bore of not less than 0.55 of external diameter of the wheel. The "1 K" type wheels are mainly used for surface grinding operations which are performed on vertical spindle surface grinding machines.

The cylinder wheels are mounted on the spindle plate by means of cementing materials, i.e. sulphur, colophony, etc.



Fig. 15



The "1 K" type wheels can be recommended for surface grinding of thin parts, or when great accuracy and smooth finish are required. For preliminary surface grinding operations performed on vertical spindle surface grinding machines segmental type wheels are recommended as they remove stock faster and more economically.

All dimensions for "1 K" type of wheels are given in Tables 27-28.

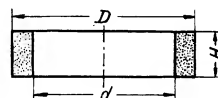


Table 27

Cylinder grinding wheels
(Type "1 K", GOST 2424-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
200	75	125	3.30	Э	46, 60
200	100	150	3.20	Э, ЭБ, КЭ	46, 60
250	125	200	5.10	Э, ЭБ, КЭ, КЭ	36—80
300	100	250	6.25	Э, ЭБ, КЭ, КЭ	36—80
350	150	250	16.25	Э, ЭБ	36, 46
400	125	300	15.80	Э	24, 36
450	125	250	31.50	Э, ЭБ	36, 46
450	125	380	13.00	Э	36, 46
450	150	250	38.00	Э, ЭБ	36, 46
500	100	400	16.00	Э	24—46

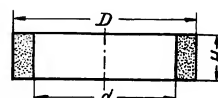


Table 28

Cylinder grinding wheels
(Type "1 K", GOST 2424-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d			
200	75	125	3.30	Э	36, 46
200	100	150	3.60	Э	36—60
250	125	200	5.00	Э, КЭ	36—60
300	100	250	5.50	Э	36—60
350	125	280	10.00	Э, КЭ	24, 36
400	125	300	17.40	Э, КЭ	16—80
450	125	250	35.00	Э, КЭ	24—60
450	125	300	28.70	Э	46
450	125	380	17.10	Э, КЭ	24—80
450	150	250	42.00	Э, КЭ	24—60
500	100	400	20.50	Э, КЭ	46, 60
600	100	480	25.50	Э, КЭ	16—80



Cylinder grinding wheels type "2 K" (fig. 16) are a variety of the "1 K" type wheels and differ from the latter by having a tapered dovetail groove by means of which the wheels are attached to the driving plate of the grinding machine.

All necessary data for "2 K" type wheels are given in Table 29.

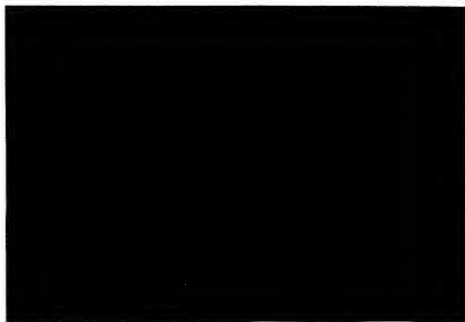


Fig. 16

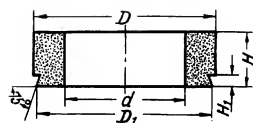


Table 29
Cylinder grinding wheels
(Type "2 K", GOST 2424-52)
Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁			
340	100	260	335	20	9.5	Г	36, 46

STRAIGHT CUP GRINDING WHEELS (Type "III", GOST 2424-52)

The type "III" wheels (fig. 17) are designed for various sharpening operations. The wheels up to 150 mm in diameter having a rim width up to 13 mm are mainly used for sharpening milling cutters, reamers, core drills, broaches, etc.



Wheels having a rim width from 15 mm and higher are used for sharpening different kinds of knives; in particular cases they can be used for surface



Fig. 17

grinding operations as well. Straight cup wheels of type "III" are also used for internal grinding operations when the bore and its adjacent face are to be ground simultaneously at one setting.

It is recommended to substitute cylinder grinding wheels of "1 K" type for larger sizes of the "III" type wheels.

All dimensions of "III" type wheels are given in Tables 30-31.

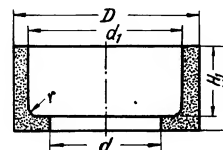


Table 30
Straight cup wheels
(Type "III", GOST 2424-52)
Vitrified bond

Dimensions, mm						Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	r			
40	25	13	32	20	3	0.035	ГВ	60
50	32	13	40	25	3	0.070	ГВ	60, 80
75	40	20	65	32	3	0.160	Г, ГВ, ГВЛ, ГВЛ	46, 60
100	50	20	85	40	4	0.380	Г, ГВ, ГВЛ, ГВЛ	36-80
125	63	32	110	50	5	0.640	Г, ГВ, ГВЛ, ГВЛ	36-80
125	63	65	85	45	4	1.045	Г, ГВ, ГВЛ, ГВЛ	36-80
150	80	32	125	65	5	1.400	Г, ГВ, ГВЛ, ГВЛ	36-80
150	63	65	100	50	5	1.650	Г, ГВ, ГВЛ	36-80
200	63	32	170	45	5	2.150	Г, ГВ, ГВЛ, ГВЛ	36-80
250	100	150	200	75	5	4.810	Г, ГВ, ГВЛ, ГВЛ	36-80



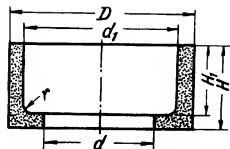


Table 31
Straight cup wheels
(Type "III", GOST 2424-52)

Resinoid bond

Dimensions, mm						Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	r			
125	63	65	85	45	4	1.20	Ж	80
150	80	32	125	65	5	1.50	Ж	36-80
150	63	65	100	40	5	1.75	Ж, КЗ	46-80
250	100	150	200	75	5	5.40	Ж	36-60

FLARING CUP GRINDING WHEELS (Type "ЧК", GOST 2424-52)

The cup wheels of type "ЧК" (fig. 18) have a greatly expanded field of application. The cup wheels up to 150 mm in diameter with an external

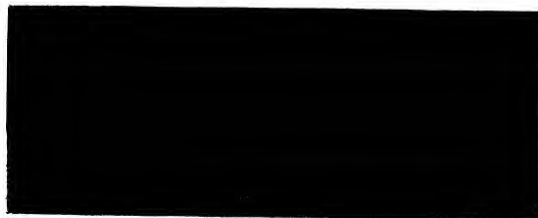


Fig. 18

angle of gradient of 70° are used for sharpening milling cutters, reamers, broaches, circular cutters, etc. The wheels of type "ЧК" having a fine grain size are used for lapping the cutting edges of rack-shaped gear cutters, circular cutters, shaper cutters, etc. and for surface grinding of the relief angle of core drills, broaches, milling cutters, etc.

The wheels with a 50° external angle of gradient are used for grinding parts having tapered surfaces such as ways of machine tool beds, saddles, etc.

Wheels of 175 mm in diameter and higher are used for sharpening different sizes of cutters.

All dimensions of the flaring cup wheels of type "ЧК" are given in Tables 32-33.

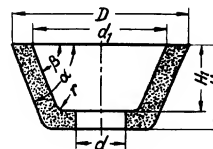


Table 32
Flaring cup wheels
(Type "III", GOST 2424-52)

Vitrified bond

Dimensions, mm									Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	r	α°	β°	r			
50	25	13	40	18	70	65	3		0.045	Ж, ЖБ	60, 80
75	30	20	65	22	70	65	3		0.100	Ж, ЖБ, КЗ	46-80
100	30	20	80	20	50	55	4		0.170	Ж, ЖБ, КЗ	46-80
100	35	20	85	25	70	65	4		0.220	Ж, ЖБ, КЗ, КЗ	46-80
125	35	32	105	25	50	55	4		0.280	Ж, ЖБ, КЗ	36-60
125	45	32	105	32	70	65	4		0.430	Ж, ЖБ, КЗ, КЗ	36-80
150	35	32	125	23	50	55	5		0.470	Ж, ЖБ, КЗ	36-80
150	50	32	130	35	70	65	5		0.700	Ж, ЖБ, КЗ, КЗ	36-80
175	63	32	130	45	60	60	5		1.300	Ж, ЖБ, КЗ, КЗ	36-60
250	150	100	190	100	80	80	5		6.800	Ж, ЖБ, КЗ, КЗ	36-60
300	150	150	230	110	80	80	5		10.100	Ж, КЗ, КЗ	36-80

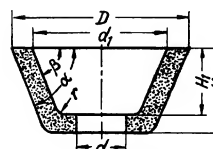


Table 33
Flaring cup wheels
(Type "ЧК", GOST 2424-52)

Resinoid bond

Dimensions, mm									Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	d ₁	H ₁	r	α°	β°	r			
75	30	20	65	22	70	65	3		0.16	Ж	60
100	35	20	85	25	70	65	4		0.34	Ж, КЗ	60, 80
125	45	32	105	32	70	65	4		0.47	Ж, КЗ, КЗ	24-180
150	35	32	125	23	50	55	5		0.52	Ж	46, 60
150	50	32	130	35	70	65	5		0.77	Ж, КЗ	36-240

DISH GRINDING WHEELS

(Types "1 T", "2 T", "3 T", GOST 2424-52)

The type "1 T" wheels (fig. 19) are used for sharpening milling cutters, reamers, broaches and other kinds of cutting tools. Wheels of this type having a fine grain size are mainly used for lapping cutting edges of different types of small tools.





Fig. 19

All dimensions of the "1T" type of wheels are given in Tables 34-35.

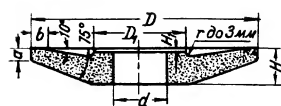


Fig. 20

Dish wheels
(Type "1T", GOST 2424-52)

Vitrified bond

Dimensions, mm							
D	H	d	D ₁	D ₂	a	b	
75	8	13	30	3	2	4	0.045
100	10	20	40	4	2	6	0.090
125	13	32	50	5	3	6	0.140
150	16	32	60	6	4	8	0.10
200	20	32	80	8	4	10	0.161
250	25	32	100	10	6	13	1.23

Dish wheels
(Type "1T", GOST 2424-52)

Resinoid bond

Dimensions, mm							
D	H	d	D ₁	D ₂	a	b	
75	8	13	30	3	2	4	0.04
100	10	20	40	4	3	6	0.09
125	13	32	50	5	3	6	0.14
150	16	32	60	6	4	8	0.10

Dish wheels of type "2T" are mainly used for sharpening involute gear cutters. All dimensions of this type of wheels are given in Table 36.

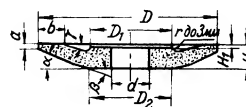


Table 36

Dish wheels
(Type "2T", GOST 2424-52)

Vitrified bond

Dimensions, mm							
D	H	d	D ₁	D ₂	a	b	
175	16	32	75	3	3	15	0.53
175	20	32	85	3	3	18	0.63

Dish wheels of type "3T" (fig. 20) are generally used for gear grinding operations and for sharpening different kinds of tools.

All dimensions of this type of wheel are given in Table 37.

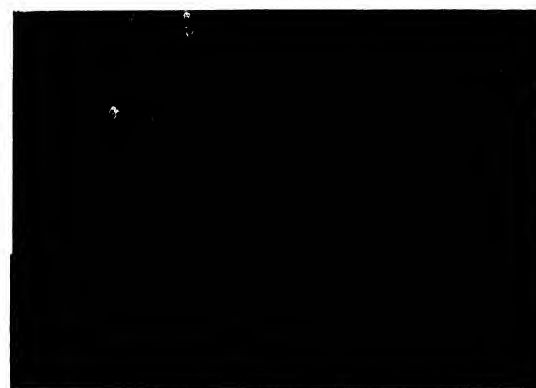


Fig. 20



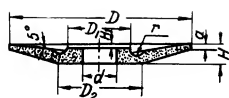


Table 37

Dish wheels
(Type "3 T", GOST 2424-52)

Vitrified bond

Dimensions, mm										Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	D ₁	D ₂	H ₁	r	a					
225	18	40	120	105	2	8	2	0.82	ЖБ	46-80		
225	18	40	120	105	2	8	4	0.90	ЖБ	46-80		
225	18	40	120	105	2	8	6	0.97	ЖБ	46-80		
275	20	50	125	105	4	10	4	1.35	ЖБ	46-80		
275	20	50	125	105	4	10	6	1.40	ЖБ	46-80		

WHEELS FOR GRINDING SNAP GAUGES

(Type "C", GOST 2424-52)

The type "C" wheels (fig. 21) are designed for special grinding machines and are advantageously used for surface grinding of snap gauges and vernier calipers.

The dimensions of this type of wheels are given in Table 38.

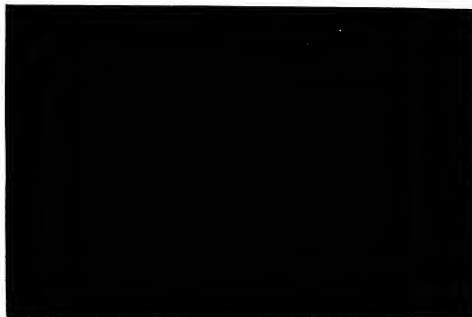


Fig. 21

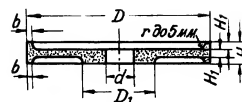


Table 38

Wheels for grinding snap gauges
(Type "C", GOST 2424-52)

Vitrified bond

Dimensions, mm										Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	D ₁	D ₂	H ₁	r	a					
150	10	32	65	3	6			0.14	Ж, ЖБ	46, 60		
150	16	32	65	5	6			0.22	Ж, ЖБ	46, 60		
175	16	32	65	5	6			0.41	Ж, ЖБ	46, 60		
175	25	32	—	8	6			0.60	Ж, ЖБ	46, 60		
200	25	32	—	8	8			0.82	Ж, ЖБ	46, 60		
200	50	32	—	16	8			0.92	Ж, ЖБ	46, 60		
250	20	75	125	6	8			1.34	Ж, ЖБ	46, 60		
300	16	127	150	5	10			0.94	Ж, ЖБ	46, 60		

GRINDING WHEELS FOR SHARPENING NEEDLES

(Type "H", GOST 2424-52)

The type "H" wheels are specially designed for the pointing of needles. In order to lengthen the travel of the needle to be pointed and to ensure a good contact between the needle and the wheel surface, the periphery of these wheels have radius grooves.

All data pertaining to these wheels are given in Table 39.

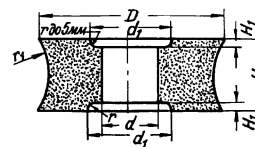


Table 39

Wheels for sharpening needles
(Type "H", GOST 2424-52)

Vitrified bond

Dimensions, mm										Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	D ₁	D ₂	H ₁	r	a					
250	125	75	100	25	125			12.6	Ж	60		
400	150	100	170	25	150			40.0	Ж	60		
450	200	150	225	25	200			63.00	Ж	60		

STEEL CENTERED ABRASIVE SAWS

(Type "M", GOST 2424-52)

The type "M" steel centered abrasive saw is a bonded abrasive wheel which is vulcanized or cemented to a steel centered disc. This type of saw is mainly used for cutting blocks of marble, granite, asbestos, refractory bricks and other mineral materials.



All dimensions of this type of saw are given in Table 40.

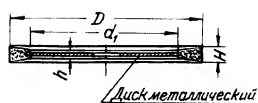


Table 40
Steel centered abrasivesaws
(Type "M", GOST 2424-52)

Dimensions, mm				Abrasive material	Grain size (most commonly used)
D	H	d ₁	h		
350	8	250	5	КМ	16, 24
400	8	300	6	КМ	16, 24

GRINDING WHEELS FOR SHARPENING MOWER KNIVES

(Type "KC", GOST 2424-52)

The type "KC" grinding wheels (fig. 22) are specially designed for hand sharpening of mower and combine knives assembled in holders.

All dimensions of this kind of wheels are given in Tables 41 and 42.



Fig. 22

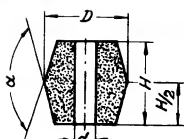


Table 41
Wheels for sharpening mower knives
(Type "KC", GOST 2424-52)

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	T	a°			
90	90	20	150		0.912	Г	36, 46

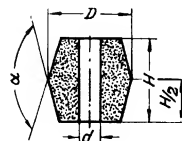


Table 42
Wheels for sharpening mower knives
(Type "KC", GOST 2424-52)

Dimensions, mm				Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	a			
90	90	20	150	1.00	Г	36, 46

MOUNTED WHEELS AND POINTS

(GOST 2447-52)

Fig. 23 shows a large number of mounted wheels and points widely used in the tool room and die shop for making moulds and dies, and for touching up dies while they are in service. Mounted wheels and points are used on castings to clean up hard-to-reach spots and small fillets and similar jobs along the seams and fillets of large welded parts.

The "TIP" mounted wheels are well suited for internal grinding operations performed on internal grinding machines when straight wheels of the type "III" cannot be used.

The type "TX" is advantageously used for work in less accessible spots, and for grinding of different shapes of grooves. The types "TK" and "T60" are mainly suited for grinding taper surfaces and centres.

Mounted points of the type "TCB" are used for grinding parts having irregular shapes of a large radius and type "TII" for parts of small radius shapes. The type "TIII" mounted points are mainly suited for grinding part of complicated shapes.

All necessary data and shapes of mounted wheels and points are given in Tables 43-49.



Fig. 23



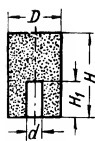


Table 43

Cylindrical mounted wheels
(Type "TIT", GOST 2447-52)

Vitrified bond

Dimensions, mm				Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	H ₁			
4	10	1.5	6	0.0003	3	100
6	10	2	6	0.0006	3, 2B5	60, 80
6	16	2	6	0.001	3	60, 80
8	10	2	6	0.001	3, 2B5	60, 80
10	10	3	6	0.002	3, 2B5	60, 80
10	25	3	10	0.004	3, 2B5	60, 80
12	16	4	8	0.004	3, 2B5	60, 80
15	20	5	8	0.008	3, 2B5	60, 80
15	40	5	20	0.015	3	60
20	32	6	13	0.022	3	60
20	60	6	25	0.053	3	60
25	32	6	13	0.035	3, 2B5	56-80
30	32	6	13	0.051	3, 2B5	36-60
40	75	16	30	0.207	3	60

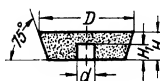


Table 44

Angular mounted wheel
(Type "TX", GOST 2447-52)

Vitrified bond

Dimensions, mm				Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	H ₁			
15	8	3	6	0.0023	3	60
35	10	6	6	0.018	3	56, 60

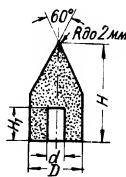


Table 45

60° Taper mounted points
(Type "T 60", GOST 2447-52)

Vitrified bond

Dimensions, mm				Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	H ₁			
10	25	3	10	0.0033	3, 2B5	56-80
20	35	6	13	0.017	3, 2B5	56-80
30	50	6	20	0.054	3, 2B5	56-80

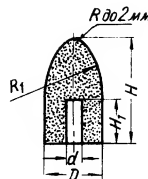


Table 46

Arched mounted points
(Type "TCA", GOST 2447-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	H ₁	R ₁			
10	20	3	8	25	0.0023	3	60, 80
20	50	6	16	50	0.02	3	60

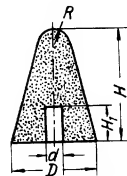


Table 47

Taper mounted points with a rounded top
(Type "TIR", GOST 2447-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	H ₁	R			
15	16	3	6	2	0.005	3, 2B5	60, 80
20	32	6	13	3	0.020	3, 2B5	56, 60
25	32	6	13	5	0.033	2B5	56
30	40	6	13	5	0.065	3, 2B5	56, 60
35	75	10	30	5	0.125	3	56

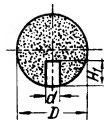


Table 48

Spherical mounted points
(Type "TIII", GOST 2447-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	d	H ₁			
10	3	4	0.002	3	60, 80
15	3	6	0.004	3	60, 80
20	6	8	0.009	3	60, 80
25	6	10	0.018	3	60
30	6	13	0.031	3	56, 60



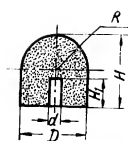


Table 49

Spherical mounted points with a cylindrical surface
(Type "THH", GOST 2456-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	H	d	D ₁	R			
25	25	6	10	0.5	0.003	ДБ, ДБ	60, 60

ABRASIVE STICKS (GOST 2456-52)

Abrasive sticks (fig. 24) are used for hand grinding operations and for honing, lapping and superfinishing operations performed on special machines. For manual work all types of sticks except "BX", "BXB" and partially "BKb" are used.

The sticks of type "BKb", "BX" and "BXB" are mainly used for lapping, honing and superfinishing different parts.

All dimensions and shapes of sticks are given in Tables 50-56.



Fig. 24

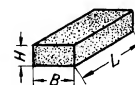


Square abrasive sticks
(Type "BKb", GOST 2456-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
A	B	L			
6	100		0.014	ДБ, ДБ	150-320
8	75		0.013	ДБ, ДБ	100-M 28
10	100		0.023	ДБ, ДБ	100-320
10	150		0.034	ДБ, ДБ	120-320

Table 55

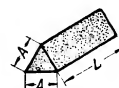


Flat abrasive sticks
(Type "BKb", GOST 2456-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	H	L			
20	10	150	0.070	ДБ, ДБ	120-250
20	13	150	0.092	ДБ	120-M 28
20	16	150	0.011	ДБ, ДБ	120-180
25	16	150	0.125	ДБ, ДБ	100-250
30	13	200	0.180	ДБ	120
30	20	200	0.275	ДБ, ДБ	120-180
40	13	200	0.250	ДБ	220
40	20	200	0.350	ДБ	100-320

Table 51



Triangular abrasive sticks
(Type "BKb", GOST 2456-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	H	L			
10	150		0.010	ДБ	100-220
13	150		0.017	ДБ	100-220
16	150		0.026	ДБ	100-220

Table 52



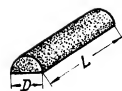
Round abrasive sticks
(Type "BKb", GOST 2456-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	L				
10	100		0.018	ДБ	120
10	150		0.028	ДБ	120, 150
13	150		0.046	ДБ	120
16	150		0.069	ДБ	150

Table 53

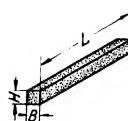




Half-round abrasive sticks
(Type "B11c", GOST 2456-52)

Vitrified bond

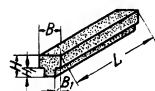
Dimensions, mm		Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
D	L			
10	150	0.014	OB	120
13	150	0.023	OB	120
20	200	0.070	OB	220



Honing sticks
(Type "BX", GOST 2456-52)

Vitrified bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	L	H			
6	15	5	0.002	OB, 133	120 M 28
9	32	8	0.006	OB, 133	120 M 28
9	63	8	0.012	OB, 133	120 M 28
9	100	8	0.020	OB, 133	120 M 28
10	50	9	0.009	OB, 133	120 M 28
11	100	9	0.023	OB, 133	120 M 28
15	150	15	0.062	OB, 133	120 M 28



Honing sticks
(Type "BXB", GOST 2456-52)

Vitrified bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	L	H	H1	B1			
3.5	40	3.5	1	0.5	0.001	O, 133	220 M 20

ABRASIVE SEGMENTS (GOST 2464-52)

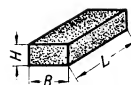
For finishing larger areas in surface grinding than can be readily handled by the standard cylindrical and cup wheels, there are available segments held in chucks, in shapes which are shown on fig. 25 and the dimensions of which are given in Tables 57-62.



Segmental wheels are especially good for sharpening of tobacco leaf knives and shelling knives because these wheels allow the coolant to be applied at the point of grinding contact. Thus, a good deal of heat is absorbed which is very important for sharpening operations.



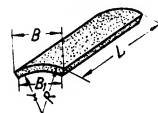
Fig. 25



Flat abrasive segments
(Type "C1F", GOST 2464-52)

Resinoid bond

Dimensions, mm			Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	H	L			
50	25	150	0.47	O	36
60	20	125	0.41	O	36
60	25	125	0.52	O	36
75	25	150	0.77	O, 133	24, 36
80	25	150	0.83	O	16-60
90	35	150	1.32	O, OB	24-60
100	50	200	2.00	O	36
120	35	150	1.73	O	24, 36
125	50	200	3.10	O	24, 36



Convex-concave abrasive segments
(Type "1C", GOST 2464-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B1	L	R	r			
55	40	125	100	80	0.33	O	24-60
60	40	75	85	60	0.26	O, 133	24, 36
70	35	125	125	107	0.36	O, 133	24, 36
75	50	125	125	107	0.36	O, 133	24, 36



Contd.

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B ₀	L	R	r			
90	55	125	175	130	0.87	Д, ЛЭ	24, 36
100	85	125	125	107	0.57	Д, ЛЭ	24, 36
110	75	150	175	140	1.35	Д, ЛЭ	24, 36
110	90	150	200	155	1.02	Д, ЛЭ	24, 36
140	100	175	225	190	2.00	Д, ЛЭ	24, 36
150	110	200	300	250	3.57	Д, ЛЭ	24, 36

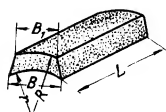


Table 59
Concave-convex abrasive segments
(Type "2C", GOST 2464-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B ₀	L	R	r			
75	80	125	170	150	0.55	Д, ЛЭ	24, 36
80	95	175	250	220	1.25	Д, ЛЭ	24, 36

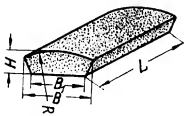


Table 60
Convex-flat abrasive segments
(Type "3C", GOST 2464-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B ₀	L	R	H			
110	75	175	300	40	1.70	Д, ЛЭ	24, 36
115	80	150	250	45	1.73	Д, ЛЭ	24, 36
210	140	300	400	100	14.50	Д, ЛЭ	24, 36

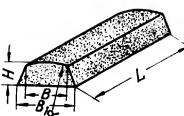


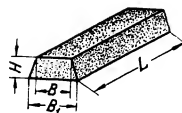
Table 61
Flat-convex abrasive segments
(Type "4C", GOST 2464-52)

Resinoid bond

Dimensions, mm					Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B ₀	L	R	H			
85	100	150	230	38	1.45	Д, ЛЭ	24—46
175	185	150	400	50	3.74	Д, ЛЭ	24—46



Table 62



Trapezoidal abrasive segments
(Type "5C", GOST 2464-52)

Resinoid bond

Dimensions, mm				Weight, kg (approximate)	Abrasive material	Grain size (most commonly used)
B	B ₀	L	H			
50	60	125	15	0.28	Д	24—60
85	100	150	35	1.13	Д, ЛЭ	16, 24

MARKING OF GRINDING WHEELS AND OTHER BONDED ABRASIVES

All grinding wheels and other bonded abrasives for the purpose of identification are marked by stencil or, if they are too small, by tag. The marking standard establishes a symbol for each of the most essential characteristics of a grinding wheel or other bonded abrasives, namely:

a) For abrasive materials:

Abrasive materials	Symbols
Electrocorundum, regular	Д
Electrocorundum, white	ДБ
Monocorundum	М
Silicon carbide, black	ЛЭ
Silicon carbide, green	ЛЗ

b) For bonds:

Bonds	Symbols
Vitrified	В
Resinoid	Л
Rubber	Р

c) Grain size is indicated by a number, namely: Nos. 12, 14, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90, 100, 120, 150, 180, 220, 240, 280, 320, 400 (M 28), 500 (M 20) and 600 (M 14).

The grain sizes Nos. 14, 20, 30, 54, 70 and 90 are used occasionally.

d) For designating structures numbers from 1 to 18 are used which cover the whole range of structures in use at present.

e) The shapes of abrasives are indicated by conventional symbols in accordance with GOST. Thus, for example, straight wheels are marked by symbols "III", etc.

f) When it is possible all the dimensions are designated by stencil, or are shown on the attached tag.

g) The grade is indicated as follows:

For vitrified and resinoid bonds — M1, M2, M3, CM1, CM2, C1, C2, CT1, CT2, CT3, T1, T2, BT1, BT2, UT1 and UT2;
for rubber and magnesite bonds — CM, C, CT and T.



In addition to the above marking the maximum permissible peripheral speed is indicated. For wheels of 250 mm in diameter and higher which have been tested for balance at the Manufacturer's Works the corresponding class of balance is indicated by numbers from 1 to 4.

Sequence of markings:

- 1) Abrasive material
- 2) Grain size
- 3) Grade
- 4) Bond
- 5) Structure.

Examples of the interpretation of marking symbols

Symbols	Interpretation of symbols
OB 46 CM 2 K 6	Electrocorundum white — OB, grain size — 46, grade — CM 2, vitrified bond — K, structure — 6
KV 24 CT 2 B	Silicon carbide black — KV, grain size — 24, grade — CT 2, resinoid bond — B
O 16 CT 1 B	Electrocorundum regular — O, grain size — 16, grade — CT 1, resinoid bond — B
K3 60 CM 1 K 6	Silicon carbide green — K3, grain size — 60, grade — CM 1, vitrified bond — K, structure — 6
O 100 CT B	Electrocorundum regular — O, grain size — 100, grade — CT, rubber bond — B

For accurate and safe grinding it is absolutely essential before mounting the wheel on flanges to familiarize ourselves with the marking in order to be sure that the selected wheel is best suited for the job in view.

SELECTION OF GRINDING WHEELS ACCORDING TO THE TYPE OF ABRASIVE MATERIAL

The most important properties of the abrasive material are its hardness and durability. Electrocorundum, for instance, is less hard than silicon carbide, but has a greater durability. Silicon carbide crystals are more brittle than electrocorundum crystals.

These properties determine the selection of a particular abrasive material for a given job.

If the materials to be ground have a high tensile strength, they will break-off small silicon carbide crystals before the latter get dulled. In consequence the wheel shows a rapid wear and is not efficient in service.

For grinding materials with a high tensile strength, as for instance steel, malleable iron and some kinds of aluminium alloys, electrocorundum wheels are best suited.

Grinding wheels of white electrocorundum are used in those cases when it is necessary to avoid a great generation of heat in the zone of grinding. These wheels are mainly used for profile grinding, thread grinding and various sharpening operations.

Monocorundum grinding wheels are used for profile grinding (for example, crankshaft grinding), tool sharpening, etc.



Silicon carbide wheels are chiefly used for materials having a low tensile strength, such as grey iron, chilled iron, bronze and brass castings, copper, hard alloys and nearly all non-metal materials—leather, minerals, bones, glass, porcelain, etc.

SELECTION OF GRINDING WHEELS ACCORDING TO THEIR GRAIN SIZE

The required grain size of the abrasives is determined by stock to be removed, the necessary surface finish and by the properties of the material to be ground. In most cases, the coarser the grain size of the wheel, the more stock can be removed.

However, this rule is not without exceptions. Thus, for example, for grinding hard (brittle) materials, it is necessary to use wheels with fine grain size.

For grinding soft materials grinding wheels with coarse grain size should be used.

When using monocorundum wheels, it should be borne in mind that the grains of these wheels possess greater cutting facilities than electrocorundum grains. Therefore to obtain a smooth surface finish it is recommended to select monocorundum wheels with a finer grain size (by 1 or 2 numbers) than that of the electrocorundum wheels.

The most commonly used grain sizes of abrasives depending on the kind of grinding operation in view are given below:

Grain size Nos. 12-16: Rough grinding of cast iron, when a great amount of stock is to be removed.

Grain size Nos. 16-24: Surfacing of steel castings and forgings, cutting-off of refractory materials, marble, steel blanks, etc.

Grain size Nos. 36-46: Sharpening of steel and hard alloy tools, grinding of non-ferrous metals, preliminary surface grinding, external cylindrical grinding and centerless grinding of a great variety of parts.

Grain size Nos. 60-80: Finish grinding with the periphery of the wheel, sharpening of various tools, profile grinding, grinding of ball and roller bearing races.

Grain size Nos. 100-220: Lapping of cutting edges of different tools, preliminary honing operations, thread grinding, grinding of glass, etc.

Grain size Nos. 240-M28: Finish thread grinding, honing and lapping.

Grain size Nos. M 20-M 14: Superfinishing operations.

It should be emphasized that the selection of the abrasive is also dependent on the skill of the operator.

SELECTION OF GRINDING WHEELS ACCORDING TO GRADE AND BOND

The correct selection of grinding wheels in respect to their grade (bond hardness) is one of the most important factors of successful grinding.

When selecting the wheel grade it is of great importance to take into consideration the physical and mechanical properties of the materials to be ground, the surface finish required, etc.

Table 63 shows the most commonly used grinding wheels made of different abrasive materials, having different grain sizes and grades depending upon the kind of the bond.



As a rule, for most grinding jobs wheels on vitrified and resinoid bonds are generally applied. Rough grinding operations are mostly performed by means of resinoid bonded wheels. Vitrified bonded wheels are seldom used for this kind of work. Surface grinding operations carried out by using the wheel face or the segment type wheels are preferably accomplished with abrasives on resinoid bond. When sharpening cutting edges of different tools or grinding thin pipes and sheets, where overheating should be avoided, it is recommended to use soft resinoid bonded wheels.

Resinoid or rubber bonds are usually applied when it is necessary to obtain a fine surface finish.

Rubber bonded wheels are extensively used for grinding ball and roller bearings.

Table 63

Bond	Abrasive materials	Grain size (most commonly used)	Grade
Magnesite	Electrocorundum	24, 36, 46	C, CT
Vitrified	Electrocorundum	16, 24, 36, 46, 60, 80, 100, 120	M 3, CM 1, CM 2, C 1, C 2, CT 1, CT 2, CT 3, T 1, T 2, BT 1 and rare M 1, M 2, BT 2, HT 1, HT 2
	Electrocorundum white	36, 46, 60, 80, 100, 120, 150, 180, 220, 250, 280, 320 and rare M 28, M 20	
	Monocorundum	36, 46, 60, 80	
	Silicon carbide black	12, 16, 24, 36, 46, 60, 80, 100, 120, 150, 180	
Resinoid	Silicon carbide green	36, 46, 60, 80, 100, 120, 150, 180, 220, 250, 280, 320 and rare M 28, M 20	CM 1, CM 2, C 1, C 2, CT 1, CT 2, CT 3 and rare T 1
	Electrocorundum	12, 16, 24, 36, 46, 60, 80, 100, 120, 150, 180, 220	
	Electrocorundum white	only in rare cases mainly 100, 120, 150, 180, 220	
	Monocorundum	24, 36, 46, 60, 80, 100, 120	
Rubber	Silicon carbide black	12, 16, 24, 36, 46, 60, 80, 100, 120, 150, 180, 220	CM, C, CT, T
	Silicon carbide green	only in rare cases, mainly 150, 180, 220, 250, 280, 320	
	Electrocorundum	36, 46, 60, 80, 100, 120, 180, 220	
Rubber	Silicon carbide black	36, 60, 80, 100, 120	

SELECTION OF GRINDING WHEELS ACCORDING TO THEIR STRUCTURE

When selecting the structure of wheels, the following three factors should be considered:

- 1) Physical and mechanical properties of the material to be ground;
- 2) Required surface finish;
- 3) Kind of grinding operation in view.

Thus, for instance, for grinding soft materials it is recommended to use open structure wheels, while dense structure wheels are mainly suitable for rough grinding operations.

Most commonly used wheels are those with a structure 5-8. Wheels with structure 5 are used for external cylindrical grinding, and with structure 8—for surface and internal grinding.

Superporous wheels with structure 14-16 are applied for surface grinding jobs and wheels with structure 13—for external cylindrical grinding.

Tables 64 and 65 contain grinding wheel recommendations for a great many grinding operations on a diversity of parts and various materials.

Table 64

GRINDING WHEEL RECOMMENDATIONS FOR METALS AND THEIR ALLOYS

Parts to be ground	Material to be ground	Grinding operation	Abrasive	Grain size	Grade	Bond
1	2	3	4	5	6	7
Agricultural forks	Steel	Rough grinding of forging	3	16-24	CT 2-CT 3	B
Aluminum parts	Aluminum and its alloys	Fork prong sharpening	3	24-36	CT 2-CT 3	B
		External cylindrical rough grinding	134	34-46	CM 2-C 1	R
Arbors	Carbon steel, hardened	External cylindrical finish grinding	134	60-80	CM 1-CM 2	R
		Surface grinding	134	36	CM 1-CM 2	R
		Internal grinding	134	46-60	CM 1-CM 2	R
		Centerless grinding	134	46-60	CM 1-CM 2	R
Armature	Cast iron	Chilling-off	3	24-36	CT	R
		External cylindrical preliminary grinding	3	36-46	C 1-C 2	R
Armour plates	Steel	External cylindrical finish grinding	3	60-80	CM 2-C 1	R
		External rough grinding	134	24	CT 1-CT 2	R
Axes	Steel, hardened	External cylindrical grinding	134	16-24	CT 1-CT 3	B
		Internal grinding	3	46	C 2	R
Axles (auto-tractors)	Steel, hardened	Rough surface grinding	3	60	CM 2	R
		Surface grinding	3	16-24	CT 1-CT 2	B
		Edging	3	16-24	CM 2-C 2	B
		External cylindrical preliminary grinding	3	24-36	CT 2-CT 3	B
Axle shafts (auto-tractors)	Steel	External cylindrical finish grinding	3	36-46	CT 1-C 2	B
		External cylindrical grinding	3	46-60	CM 1-CM 2	R
		External centerless grinding	3	46-60	CM 2-C 1	R
		External centerless grinding	3	36-46	C 1-C 2	B
Balls for ball bearings	Steel, not hardened	Surface grinding	3	60-80	CM 2-C 1	B
		External cylindrical preliminary grinding	3	36-46	CT 1	R
		External cylindrical grinding (finishing)	3	46-60	C 1-C 2	R
		Preliminary grinding	3	24-36	BT 1-HT 1	R
Ball races	Steel, hardened	Finish grinding	3, 134	250	BT 1-HT 1	R
		Preliminary external centerless grinding	3	46	M 3-CM 2	R
		External centerless grinding	3	60-80	CT	B
		External centerless preliminary and finish grinding at one setting	3	60	CT	B
Ball races	Steel, hardened and not hardened	Internal grinding of external races	3	80	CT 1-CT 2	R
		Wheel diameter up to 10 mm	3	60-80	C 2	R
		Wheel diameter from 10 to 25 mm	3	60	C 1	R
		Wheel diameter from 25 to 40 mm	3	60	CM 2	R



Contd.

1	2	3	4	5	6	7
Hall races	Bearing steel, hardened and not hardened	wheel diameter from 60 to 100 mm	0B	60	CM 1	K
	"	wheel diameter over 100 mm	0B	60	M 3	K
	"	Preliminary grinding of external race roller ways				
	"	wheel diameter up to 40 mm	0B	60	C 1	K
	"	wheel diameter from 40 to 80 mm	0B	60	CM 2	K
	"	wheel diameter from 80 mm and over	0B	60	CM 1	K
	"	Doitto (finishing)				
	"	wheel diameter up to 40 mm	0B	120	CM 2	K
	"	wheel diameter from 40 to 80 mm	0B	120	CM 1	K
	"	wheel diameter from 80 mm and over	0B	120	M 3	K
	"	60 mm and over				
	"	Preliminary grinding of external race radius				
	"	wheel diameter up to 45 mm	2	100-120	CT	B
	"	wheel diameter from 45 mm and over	2	80	CT	B
	"	Doitto (finishing)				
	"	wheel diameter up to 45 mm	2	180-220	CT	B
	"	wheel diameter from 45 to 80 mm	2	150	C+CT	B
	"	wheel diameter from 80 to 90 mm	2	120	C	B
	"	wheel diameter from 90 to 125 mm	2	120	C+CM	B
	"	Grinding of internal race radius	2	120-220	CT	B
	"	Preliminary grinding of internal race roller ways	2	60	CM 2+1	K
	"	Doitto (finishing)	2	100	CM 2	K
	"	Grinding of internal race shoulders	2	80	CM 2+1	K
	"	Grinding of external race shoulders	2	60	CM 2+1	K
	"	Surface grinding of races	2	60-80	CM 1+1	K
Band saws	Steel, carbon and high speed	Gunning	2	38-60	C	B
	"	"	2	46-60	CM 2+2	B
Barrels of sealing hammers	Steel, not hardened	Internal grinding	2	56	C+CT	K
Bearing bushings	Bronze	"				
	"	Rough face grinding	2	24-36	C+CT	K
	"	External cylindrical grinding	1B1	36-56	CM 2+1	K
Bed ways of machine tools	Cast iron	Internal grinding	1B1	46-60	CM 1+CM 2	K
	"	Preliminary grinding	1B1	24-36	CM 2+1	K
	"	Finishing surface grinding	1B1	46-60	CM 1+CM 2	K
Bicycle forks	Steel	Hand sold surfacing	2	16-24	CT 1+CT 2	K
Bicycle handle bars	"	Surfacing of welds	2	24-36	CT 1+CT 2	K
Bicycle spokes	"	"				
Blades for meat choppers	Steel, hardened	Surfacing of ends	2	36-60	CT 2+CT 3	K
	"	Hand sharpening	2	56-60	C+CT	K
Boring bars	"	"				
	"	External cylindrical rough grinding	2	56	C 1	K
	"	External cylindrical finish grinding	2	60	CM 2	K
Brass parts	Brass	External centerless grinding	1B1	36	C 2	K
	"	External cylindrical grinding	1B1	36	CM 1	K
	"	Internal grinding	1B1	36	M 3	K
	"	Surface grinding with cup wheels	1B1	24	M 3	K
	"	Doitto, with the wheel face	1B1	16-24	C 1	K
	"	Doitto, grinding	1B1	24	CT 1	K
	"	Cutting-off	2	24-36	CT 2	K
Broaches, flat	Steel, high speed	Sharpening (with dish)	0B	60	CM 2	K



Contd.,

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Contd.

1	2	3	4	5	6	7
Chisels	Steel, carbon	Rough grinding	2	24	CT1-CT2	R
Chisels, handled	Steel, carbon and high speed	Surface grinding with the wheel face	2	36-46	CT2-CT1	R
Choppers	Steel, hardened	Grinding of edges	2	24-36	M2-CM1	R
Chromium plated parts	..	Hand sharpening	2	36-46	CT1-CT2	R
Circular forming tools	Steel, high speed	Rough surface grinding	2	16-24	CT1-CT2	R
Circular saws, segmental (metal cutting)	..	Sharpening	2	24-36	CT1	R
Circular saws (woodworking)	Steel, carbon	Preliminary external cylindrical grinding	2	60	CM2	R
Circular saws (metal cutting)	Steel	Finish external cylindrical grinding	2	150	CM1	R
Circular thread chasers	Steel, carbon and high speed	Sharpening (with cup wheels)	2	60	CM1	R
Collets	Steel, carbon	Lapping (with cup wheels)	2	180	C2	R
Columns of metal drilling machine	Cast iron	Preliminary surface grinding with the wheel face	2	24	CT1-CT2	R
Connecting rods	Steel	Finish surface grinding with the periphery of the wheel	2	56	CM1-CM2	R
Control pins	..	Gumming	2	36-46	CT2-CT1	R
Copper parts	..	Gumming	2	36	CT1-CT1	R
Core drills for blind holes	Steel, high speed	Surface grinding (with segmental wheels)	2	24-36	CM2-C1	R
Core drills for through holes	..	External cylindrical grinding	2	36-46	CT2-CT1	R
Core drills with inserted blades	..	Thread grinding: pitch up to 1 mm	2	60-80	CM1-CM2	R
Core drills, lamellar	..	.. from 1 mm to 1.5 mm	2	320-M28	CT1-CT2	R
Core drills, stepped	..	.. 1.5 mm to 2.5 mm	2	240-320	CM2-C1	R
	..	.. 2.5 mm to 4.0 mm	2	180-240	CM1-CM2	R
	..	.. 4.0 mm to 10 mm	2	120-180	M3-CM1	R
	..	Internal grinding	2	46-60	CM1-CM2	R
	..	Cutting of grooves	2	46	CT	R
	..	External cylindrical grinding	2	46	CT1-CT2	R
	..	Surface grinding of faces	2	24-36	CM2-C1	R
	..	Internal grinding (preliminary)	2	46	CM2-C1	R
	..	Drill (finishing)	2	60	CM1-CM2	R
	..	Grinding of eyes	2	36	CM2-C1	R
	..	Centerless external grinding	2	60	CM2-C1	R
	..	External cylindrical grinding	2	46	M3-CM1	R
	..	Surface grinding with cup wheels	2	150	M3	R
	..	With the wheel face	2	20	C1	R
	..	Cutting-off	2	46-60	CT	R
	..	Sharpening the front face of teeth (with dish wheels)	2	60	CM2	R
	..	Drill, lapping	2	180	C2	R
	..	Relief grinding (with cup wheels)	2	60	CM2	R
	..	Beveling the corners of the teeth with sticks	2	180	C2	R
	..	Sharpening (with cup wheels)	2	240	C2	R
	..	Lapping (with cup wheels)	2	46	CM2	R
	..	Grinding the face of the teeth	2	150	C2	R
	..	Sharpening (with cup wheels)	2	60	CM2	R
	..	Lapping (with cup wheels)	2	150	C2	R
	..	Sharpening (with cup wheels)	2	60	CM2	R
	..	Lapping (with cup wheels)	2	150	C2	R
	..	Grinding of the first step face	2	46	C1	R
	..	Relief grinding (with cup wheels)	2	60	CM2	R
	..	Lapping of teeth cutting edges (with dish wheels)	2	150	C2	R



Contd.

1	2	3	4	5	6	7
Core drills, stepped	Steel, high speed	Relief lapping (with cup wheels)	150	180	C2	R
Core drills with taper shanks	Steel, carbon and high speed	External cylindrical grinding	2	46-60	CM2-C1	R
	..	Cutting of flutes	2	80-100	CT1-CT2	R
	..	Sharpening (with cup wheels)	2	46-60	CM1-CM2	R
	..	Lapping (with cup wheels)	2	180	C2	R
Crankcases (auto-tractor engines)	Grey iron	Rough surface grinding	150	16-24	CT1-CT2	R
Crankshafts (auto-tractor)	Steel, hot hardened	Rough grinding of pins and journals	2	16-24	CT2-CT3	R
	..	Preliminary grinding of pins	2	36	CT2-CT3	R
	..	Preliminary grinding of pins and journals	2	36	CT1-CT2	R
	..	Finish grinding of pins and journals	2	56-60	C2-CT1	R
	..	Preliminary grinding of journals	2	56	C2-CT1	R
	..	Finish grinding of journals	2	56-60	C2-CT1	R
	..	Grinding of flywheel journal	2	56	C1-C2	R
	..	Cheek profile grinding	2	36-46	CM2-C1	R
	..	Regrounding of journals	2	36-46	C2-CT1	R
Cutlery	Steel, carbon and stainless	Grinding of tang	2	36-46	C2-CT2	R
	..	Sharpening (preliminary)	2	36-46	CT2-CT1	R
	..	Sharpening (finishing)	2	60-80	CM2-C1	R
	..	Sharpening	2	60-80	CM1-CM2	R
Cutters for engraving machines	Steel, carbon	Sharpening	2	46-60	CM2-C1	R
Cutters for pantograph machines	Steel, high speed	Sharpening	2	60	C1	R
Cylinder block	..	Preliminary honing	1120	120-150	C1-CT2	R
Cylinder liners (auto-tractor motors)	Cast iron	Finish honing	150	M28-M29	M3-CM1	R
	..	Surface grinding of flanges	150	36	CM2	R
	..	External cylindrical grinding	2	36-46	CM2-C1	R
	..	Internal grinding	2	46	CM1-CM2	R
	..	Honing (preliminary)	150	120-150	CT1-CT3	R
	..	Honing (finishing)	150	M28-M29	M3-CM1	R
Cylinder liners (diesel engines)	Steel, nitrided	Internal preliminary grinding	2	26	C2	R
	..	Internal finish grinding	150	120-220	CM1-CM2	R
	..	Honing	150	M28-M29	M3-CM1	R
Dies for die casting	Steel	Surface grinding with the wheel face	2	24-36	M3-CM1	R
Dies for dieheads	Steel, high speed	Sharpening	2	46	CM1-CM2	R
Dies for diestocks	Steel, carbon and high speed	Lapping	150	180	C2	R
	..	Surface grinding with the wheel face	2	36-46	CM1-CM2	R
	..	Surface grinding	2	24-36	CT1-CT2	R
	..	Thread grinding	2	46-60	CM2-C1	R
	..	Sharpening	2	240-320	CM1-C2	R
	..	Sharpening	2	46-60	CT1-CT2	R
Double angle milling cutters	Steel, high speed	Sharpening of cutting edges	2	46	CM1	R
	..	Relief grinding (with cup wheels)	2	60	CM2	R
	..	Lapping (with cup and dish wheels)	2	150	C2	R
	..	Resharpening (hand)	2	60-80	CT1-CT2	R
Drills (up to 10 mm diameter)	Steel, carbon and high speed	Resharpening (hand)	2	36-46	CM2-C1	R
Drills (over 10 mm diameter)	..	Sharpening	150	16-60	CM1-CM2	R
Drills	Cemented carbides	Preliminary surface grinding	2	24-36	C2-CT1	R
Drawing dies	Steel	Hand surface grinding	2	60-80	CM2-C1	R
	..	Hand internal grinding	2	46-60	CT1-CT1	R
	..	Internal grinding	2	46	CM1-C1	R
	..	External cylindrical grinding	150	46-80	CM1-CM2	R
Drums of textile machines	Grey iron	Grinding of blades (outside diameter and faces)	150	60	CM1-CM2	R
Face milling cutters with inserted blades	Cemented carbides	Relief grinding (with cup wheels)	150	46	M3-CM1	R





Contd.

1	2	3	4	5	6	7
Micrometer frames	Steel, not hardened	Surface grinding with the face of the wheel	10	24-36	CM1-C1	R
	Steel, hardened	Surface grinding with the periphery of the wheel	10	24-36	CM1-C2	R
			10	46-60	CM1	R
Micrometer drums	Steel, not hardened	Surface grinding with the face of the wheel	10	24	CM1-CM2	R
Micrometer inserts	Steel, hardened	External cylindrical grinding	10	46-60	CM2-C1	R
		External cylindrical preliminary grinding	10	56	CM1-CM2	R
		External cylindrical finish grinding	10	60-80	CM1-CM2	R
		Centerless external grinding	10	56	C1	R
		Internal grinding	10	60-80	CM2-C1	R
		Face grinding	10	56-60	CM1-C1	R
		Preliminary grinding of faces and axials	10	46-60	C1-C2	R
Micrometer screws	Steel, not hardened	Finish grinding of faces and axials	10	60	CM1-CM2	R
	Steel, hardened	External cylindrical preliminary grinding	10	56-60	CM2-C1	R
		External cylindrical finish grinding	10	60-80	CM2-C1	R
Micrometer thinblades	Steel, not hardened	External cylindrical grinding	10	60	CM2-C1	R
		Face grinding and chamfering	10	60	CM2-C1	R
Milling cutter blades	Steel, carbon and high speed	Sharpening	10	36-56	C1-C2	R
		Cut-off bars	10	36-56	C1-C2	R
		Face grinding	10	46-60	C2	R
		Grinding of cutting edges	10	120	C1	R
		Resharpening	10	100	C1-C2	R
Morse taper sockets	Steel, hardened	External cylindrical grinding	10	56	CM1-CM2	R
		Internal preliminary grinding	10	56	CM1-C1	R
		Internal finish grinding	10	60-80	CM1-C1	R
Pen-knives	Steel	Grinding of tang and back, rounding off back	10	56-60	C2-C1	R
		Sharpening (preliminary)	10	60-80	C1-C2	R
		Sharpening (finishing)	10	110-180	C1-C2	R
		Lapping of cutting edge	10	220-280	CM1-C1	R
Pistons (auto-tractors)	Cast iron	External cylindrical grinding	10	56-56	CM1-CM2	R
		External centerless grinding	10	56-56	CM2-C1	R
	Steel	External cylindrical grinding	10	56	CM1-CM2	R
	Aluminum	External cylindrical grinding	10	56-56	M3-CM1	R
		Centerless cylindrical grinding	10	56	M3-CM1	R
		Centerless cylindrical grinding (finishing)	10	96-100	M3	R
Piston pins (auto-tractors)	Steel, not hardened	External centerless grinding	10	36	C2-C1	R
	Steel, hardened	External centerless grinding	10	56-56	CM2-C1	R
		External centerless preliminary grinding	10	60-80	C2-C2	R
		External centerless finish grinding	10	180	C1-C2	R
		Lapping (1st operation)	10	220	C1	R
		Lapping (2nd operation)	10	320	C1	R
Piston rings (auto-tractor engines)	Cast iron	Centerless external and internal rough grinding	10	24-36	C1-C2	R
		External cylindrical grinding	10	24-36	C2-C1	R
		Preliminary bilateral surface grinding of faces	10	24-36	C2-C1	R
		Surface grinding with the periphery of the wheel	10	56-60	CM1-C1	R
Piston rings (aircraft and diesel engines)	Malleable iron	Finish surface grinding	10	100	C2	R
		Rough external and internal centerless grinding	10	24	C1	R
		Preliminary surface grinding of faces	10	36	C1	R

Contd.

1	2	3	4	5	6	7
Piston rings (aircraft and diesel engines)	Malleable iron	Finish surface grinding of faces	10	60-80	C1-C2	R
Piston rod (locomotive)	Steel	Lapping of faces	10	220	C1	R
Plain milling cutters (with coarse teeth)	Steel, high speed	External cylindrical grinding	10	56	CM2-C1	R
		Sharpening (with cup and dish wheels)	10	60	CM1-CM2	R
Plough-frame	Steel	Lapping (with cup and dish wheels)	10	180	C2	R
Plough-shares	Steel, not hardened	Rough grinding	10	16-24	CT2-CT3	R
Plug gauges	Steel, hardened	Surface rough grinding	10	16-24	CT2-CT3	R
		External finish grinding of measuring surface (30-100 mm in diameter)	10	56-60	CM2-C1	R
Plug gauges, end locking types		External preliminary grinding of measuring surface (30-100 mm in diameter)	10	56	CM2	R
		External finish grinding of measuring surface (30-100 mm in diameter)	10	60	CM2	R
Plug gauge inserts		External preliminary grinding of measuring surface (30-100 mm in diameter)	10	56-60	CM2	R
		External finish grinding of measuring surface (30-100 mm in diameter)	10	56	C1-CM2	R
Prismatic forming tools	Steel, high speed	External finish grinding of measuring surface	10	60-80	CM1-CM2	R
		Face grinding	10	16-80	C1-C2	R
		Grinding of centers	10	60-80	C2-CT1	R
		Chamber grinding	10	56-60	C1-C2	R
		Sharpening (with cup wheels)	10	60	CM2	R
		Lapping (with cup wheels)	10	180	C1-C2	R
Probes for inspection	Cast iron	Surface grinding	10	56	CM1-CM2	R
Pulleys		Rough grinding after casting	10	24	CT1-CT3	R
		External preliminary grinding of rims	10	24	CT2-CT1	R
		Internal grinding of hubs	10	26	M3-CM2	R
Punches	Steel	Internal grinding of hubs	10	56-60	CM2-C1	R
		External cylindrical grinding	10	56-60	CM1-CM2	R
	Steel, hardened	Internal grinding	10	56-60	CM2-C1	R
		External cylindrical grinding	10	60	C1	R
Rack-shaped cutters	Steel, high speed	Grinding of the tooth working surfaces	10	60	CM2	R
		Sharpening of the faces of the teeth (with cup wheels)	10	180	C2	R
		Sharpening of the face recesses of the teeth	10	80	CM2	R
Rails	Steel	Surfacing or webbs	10	16-24	CT2-CT3	R
		Removing corrugations	10	16-24	CT1-CT2	R
Railway car axles		External cylindrical grinding	10	26-56	CM1-C1	R
	Steel, not hardened	External cylindrical grinding	10	16-24	CT1-CT3	R
	Steel, hardened	Rough grinding	10	16-24	CT2-CT1	R
	Steel, manganese	External cylindrical rough grinding	10	16-24	CT2-CT1	R
Razors	Steel, not hardened	Grinding of tang, taking off burr, sagging and grinding of back edges	10	56-60	C2-CT1	R
	Steel, hardened	Edge profiling	10	100-120	C1-CT1	R
		Back profiling	10	60-80	CM1-CM2	R
		Preliminary sharpening	10	140-180	CM1-CM2	R
		Final sharpening	10	24-36	CM2-C2	R
Reamer blades	Steel, carbon and high speed	Surface grinding with the wheel face	10	26-56	M3-CM1	R
		Grinding of edges, faces and relieving	10	26-56	CM1-CM2	R
		Sharpening	10	26-56	C1-C2	R
		Sharpening (with cup wheels)	10	60	CM2	R
Reamers (hand, cylindrical and taper)	Steel, carbon	Lapping of cutting edges	10	180	C2	R
		Hand lapping of cutting edges with sticks	10	250	C2	R

Cont'd.

1	2	3	4	5	6	7
Reamers (hand, cylindrical with inserted blades)	Cemented carbides	Sharpening of cutting edges (with cup wheels)	IC1	60	M3	R
	"	Lapping of cutting edges	IC1	180	CM1	R
	"	Hand lapping of cutting edges with sticks	IC1	220	CT	R
Reamers (machine)	Steel, carbon and high speed	Cutting-off	3	56-60	CT1-CT2	B
	"	Surface grinding of cutting edges with the wheel face	3	36-56	M3-CM1	R
	"	Ditto, with the periphery of the wheel	3	56-60	CM1-CM2	R
	"	External cylindrical preliminary grinding	3B	36-56	C2-CT1	R
	"	External cylindrical finish grinding	3	56-60	CM1-C1	R
	"	Flute grinding	3	56-60	C1-C2	R
	"	Relieving	3	56-60	CM1-CM2	R
	"	Sharpening of cutting edges	3	56-60	CM1-CM2	R
Reamers (shell)	Cemented carbides	Ditto	IC1	60-80	M3-CM1	R
	Steel, high speed	Sharpening of cutting edges (with cup wheels)	3B	60	CM2	R
	"	Lapping of cutting edges	IC1	180	C2	R
	"	Hand lapping of cutting edges with sticks	3B	250	C2	R
Reamers (shell, inserted blade)	"	Grinding of the front taper part, straight part and the rear taper part of the reamer (with cup wheels)	3	60	CM2	R
	"	Sharpening of cutting edges	3B	60	CM2	R
	"	Lapping of cutting edges (with cup wheels)	IC1	180	C2	R
	"	Hand lapping of cutting edges with sticks	3B	250	C2	R
Rifle barrels	Steel	External cylindrical grinding	3	56	C1	R
Ring gauges (setting up)	Steel, hardened	Internal preliminary grinding	3B	60-80	C2-CT1	R
	"	Diameter 2-15 mm	3	56-80	C1-CT2	R
	"	Diameter 15-50 mm	3	56-80	CM2-C1	R
	"	Diameter 50-120 mm	3	56-80	CM2-C1	R
	"	Internal finish grinding	3B	80-100	C1-C2	R
	"	Diameter 2-15 mm	3	56-80	CM2-C1	R
	"	Diameter 15-50 mm	3	56-80	CM1-CM2	R
	"	Diameter 50-120 mm	3	56-80	CM1-CM2	R
	"	Snagging after riveting	3	24-36	CT2-CT3	R
Riveted joints	Steel	Thread grinding—1st operation	3B	120-180	C1-C2	R
Roller dies	Steel, carbon and high speed	Thread grinding—2nd operation	3B	240-280	C1	R
	"	Thread finish grinding	3B	320-M28	CM2-C1	R
Roller bearing races	Bearing steel	External cylindrical preliminary grinding	3	56	CM2-C1	R
	"	External cylindrical finish grinding	3	60-80	CM2-C1	R
	"	External centerless grinding	3	60-80	CM1-C1	R
	"	Internal grinding (bores less than 15 mm)	3	60-80	C2-CT1	R
	"	Internal grinding (bores over 15 mm)	3B	56-60	CM1-C1	R
Rollers (cylindrical) for bearings	Bearing steel, not hardened	External centerless grinding of rods	3	56	C1-C2	R
	Bearing steel, hardened	Preliminary external centerless grinding	3	56-60	C1	R
	"	External centerless grinding (semi-finishing)	3	60-80	CT	B
	"	Ditto (finishing)	3	100-130	CT	B
	"	Preliminary surfacing of ends	3	56	C2	R
	"	Finish surfacing	3	80	CT1	R
Rollers (cylindrical) for bearings	Bearing steel, not hardened	Preliminary external centerless grinding	3	80	CT1	R
	Bearing steel, hardened	Semi-finish external centerless grinding	3	100	CT	B



Cont'd.

1	2	3	4	5	6	7
Rollers (spherical) for bearings	Bearing steel, hardened	Finish external centerless grinding	3	120	CT	B
Rollers (taper) for bearings	Bearing steel, not hardened	Preliminary centerless taper grinding	3	56	CT1	R
	Bearing steel, hardened	Semi-finish centerless taper grinding	3	100	CT	B
	Bearing steel, hardened	Finish centerless taper grinding	3	120	CT	B
	"	Grinding of taper roller bases	3	80	CT1-CT2	R
Rolls, Cold mills	Chilled iron	Regrinding	IC1	40-60	C1-C2	B
	"	External cylindrical rough grinding	IC1	56	C1-CT1	B
	"	External cylindrical grinding (semi finish)	IC1	56-60	C1-C2	B
	"	External cylindrical grinding (extra fine finish)	IC1	220	CM2-CM1	B
	Steel, not hardened	External cylindrical rough grinding	3	56-60	C2-CT1	B
	"	External cylindrical grinding	3	36-56	C1-CT1	B
	Steel, hardened	Regrinding	3B	60-80	CM2-C1	R
	"	External cylindrical rough grinding	3B	56-60	C1-C2	R
	"	External cylindrical grinding (extra fine finish)	3B; IC1	220-240	CM1-CM2	B
	Steel, high speed	Regrinding	3B	66-100	CM1-CM2	R
	"	External cylindrical preliminary grinding	3	36-56	C1-C2	R
	"	External cylindrical finish grinding	3B	80-100	CM1-CM2	R
Rolls, Hot mills	Chilled iron	Regrinding	IC1	36-56	C1-CT2	B
	"	External cylindrical rough grinding	IC1	56-60	CT2-CT3	B
	"	External cylindrical preliminary grinding	IC1	24-36	CT1-CT2	B
	"	External cylindrical finish grinding	IC1	56-60	C1-C2	B
	"	Hand surfacing by sticks	IC1	60-80	CM2-C2	R
Rolls, Paper mills	Brass or copper	Regrinding	IC1	24-36	CM2-C1	R
	"	External cylindrical rough grinding	IC1	36-56	CM1-CM2	B
	"	External cylindrical finish grinding	IC1	100-150	M2-M3	R
Round split thread dies	Steel, carbon and high speed	Surface grinding	3	24-36	M2-CM1	R
	"	Sharpening	3	60-80	CT1-CT2	R
	"	Roughing	3	60-80	CT1-CT2	R
Safety razor blades	Steel, hardened	1st operation	3	180	M3	B
	"	Semi-finishing	3; 3B	220-250	CM1	B
	"	2nd operation	3B	220-250	CT1-CT2	B
	"	Final finishing	3B	220-250	CT1-CT2	B
	"	Resharpening	3; 3B	220-250	C1-C2	B
Saw blades	"	Sharpening	3	56-60	C2-CT1	B
	"	Coarse pitch	3B	80-120	CM2-C1	R
	"	Fine pitch	3	56	CM2-C2	R
Scrapers	Steel, carbon	Sharpening of cutting edges	3	36-56	C1-CT1	R
	"	Sharpening (with segmental wheels)	3	36	CM2-C1	B
Screw drivers (power metal shears)	Steel, hardened	Ditto (with ring wheels)	3B	36-56	CM1-CM2	B
Side and face milling cutters with inserted blades	Steel, high speed	Grinding of blades (outside diameter and faces)	3	60	C1	R
	"	Sharpening of cutting edges (with cup wheels)	3B	60	CM2	R
	"	Lapping of cutting edges (with cup wheels)	IC1	180	C2	B
Side milling cutters	"	Sharpening of cutting edges (with cup wheels)	3B	60	CM2	R
	"	Ditto, lapping (with cup wheels)	IC1	180	C2	B
	"	Lapping of cutting edge radius (with sticks by hand)	3B	250	C2	R



Cont'd.

1	2	3	4	5	6	7
Skates	Steel, not hardened	Grinding of runner side faces	3	36-46	CM 2-C1	R
Slot milling cutters	Steel, high speed	Hand sharpening	3	36-46	C1-C2	R
		External tooth grinding (outside diameter)	3	60	CM 2	R
		Flute cutting and sharpening of cutting edges	3B	46-60	C1	R
Snap gauges	Steel, not hardened, stamped	Surface grinding with the wheel face	3	25	C2-CT1	R
		Surface grinding with the periphery of the wheel	3	25	CT1-CT2	R
		Surface grinding of working measuring surfaces	3	46-60	CM1-CM2	R
Spindles	Steel	Pointing	3	60	CM1	R
Spindle-stock housings of machine tools	Cast iron	Surface grinding with the wheel face	3B	25-36	CT2-CT3	R
Spline shafts	Steel, not hardened	External cylindrical grinding	3	36-46	C2-CT1	R
	Steel, hardened	External cylindrical grinding	3	46	CM 2-C1	R
		Centerless external grinding	3	46	C1-C2	R
		Surface spline grinding	3	46-60	CM 2-C2	R
Spindles, coil	Steel	Rough grinding (squearing ends)	3	16-25	CT2-CT3	R
		Grinding of small size coil	3	60	C1	R
		Grinding of medium size coil	3	36	CT1	R
		Grinding of large size coil	3	25	CT2	R
Spindles, leaf		Grinding of eyes	3	25	CT2	R
Spindles, rail cars		Chamfering	3	16-25	CT2-CT3	R
		Tough grinding (squearing ends)	3	16-25	CT2-CT3	R
Squares	Steel, hardened	Surface grinding with the face of the wheel	3	25	CM 2-C2	R
Straight and helical gear shaper cutters (disc type)	Steel, high speed	Sharpening of the faces of the teeth	3B	60	CM1	R
		Lapping the faces of the teeth	153	180	C2	R
Strikers of scaling hammers	Steel, hardened	Centerless external grinding	3	56-60	CM1-CM2	R
Surface plates for inspection	Cast iron	Surface grinding	3	36	CM1-CM2	R
Taps	Steel, carbon and high speed	Rough grinding	3	36	CT1-CT2	R
	Steel, hardened	Surface grinding of square end	3	46-60	C1-C2	R
		External cylindrical grinding	3	46-60	CM 2-C2	R
		Shank grinding	3	46-60	C1-C2	R
		Cutting of flutes (from solid)	3	120	C1-C2	R
		Grinding of flutes	3	56-60	C1-C2	R
		Sharpening	3	46-60	CM 2-C1	R
		Thread grinding: pitch up to 1.0	3B	320-M28	C1-C2	R
		pitch 1.0-1.5 mm	3B	280-320	CM 2-C1	R
		pitch 1.5-2.5 mm	3B	180-250	CM1-CM2	R
		pitch 2.5-3.0 mm	3B	120-180	CM1	R
		Sharpening of the front face of teeth	3B	46	CM2	R
Tapered counter-shanks	Steel, high speed	Relief grinding	3B	60	CM2	R
		Lapping	153	180	C2	R
Textile machinery spindles	Steel, not hardened	External cylindrical grinding	3	46	C2-CT1	R
	Steel, hardened	External cylindrical grinding	3	46	C1-C2	R
		Centerless external grinding	3	46-60	C1-CT2	R
Thread micro-meters		External cylindrical grinding of inserts	3	46	CM1-CM2	R
		External cylindrical grinding of shanks	3	60	CM1	R
		Face grinding and chamfering	3	46	CM 2-C1	R



Cont'd.

1	2	3	4	5	6	7
Thread milling cutters (pitch 1-3 mm)	Steel, high speed	Thread grinding	153	210-280	C2-CT1	R
Thread plug gauges	Steel, hardened	Cutting of thread (from solid): pitch up to 0.75 mm	3B	M28	C2	R
		pitch 1.0-1.5 mm	3B	320	T2	R
		pitch 1.75 mm	3B	320	T1	R
			3B	280	C1	R
			3B	180	CT3	R
		Thread grinding (threads already): pitch up to 2.0 mm	3B	280	C1	R
		pitch from 2.5 to 4.0 mm	3B	220	CT3	R
		pitch from 4.5 up to 5.0 mm	3B	180	CT3	R
		pitch from 5.5 up to 6.0 mm	3B	150	CT3	R
		Surfacing of centers	3	46-60	C1-C2	R
		Face grinding of measuring sections with the periphery of the wheel	3B	46-60	CM1-CM2	R
		Preparatory cylindrical grinding of shanks and undercutting of faces	3B	36-46	M3-CM1	R
		Grinding of shanks and undercutting of faces	3B	46	CM1-CM2	R
		Grinding of shanks and undercutting of faces	3B	60	CM1	R
Thread plug gauges ("go")		External cylindrical finish grinding: diameter 3-50 mm	3B	60-80	CM 2-C1	R
		diameter 50-130 mm	3B	46-60	CM 2-C1	R
		Chamfer finish grinding	3B	80	C1	R
		Rounding off thread edges from both sides	3B	80	C1	R
Thread plug gauges ("not go")		External cylindrical finish grinding: diameter 3-50 mm	3B	80	C1	R
		diameter 50-130 mm	3B	60	C1	R
		Thread finish grinding	3B	180-220	C2	R
		Surface grinding (with the wheel face)	3	25	CM 2-C1	R
		Surface grinding (with the periphery of the wheel)	3	25-36	M3-CM1	R
		Internal grinding	3B	60-80	M3-CM1	R
		Preparatory thread grinding	3B	180	CM2	R
		Finish thread grinding: pitch 2-3 mm	3B	140	C2	R
		pitch 3-5 mm	3B	120	C1	R
Threading tools	Steel, carbon, hardened	Surface grinding (with cup wheels)	3	36-46	M3-CM1	R
	Steel, high speed	Sharpening	3	46-60	CM 2-C1	R
		Sharpening of cutting edges and relieving (with cup wheels)	3B	60	CM2	R
		Lapping (with cup wheels)	153	180	C2	R
		Hand lapping (with sticks)	3B	240	C1	R
Tubes	Steel	Internal rough grinding and end surfacing	3	16-25	CT1-CT2	R
		Cylindrical external grinding	3	46	CM 2-C1	R
		Centerless external grinding	3	46-60	C1-C2	R
		Cutting-off	3	36-46	CT1-CT3	R
		Cutting-off	3	46	CT	R
		Cutting-off	3	60	CT	R
	Steel, stainless chrome-molybdenum	Cutting-off	3	24-36	CT	R
	Aluminum or brass	Cutting-off	3	16-25	CT2-CT3	R
	Cast iron	Internal rough grinding and end surfacing	153	16-25	CT2-CT3	R
		Cylindrical external grinding	153	36-46	CM1-CM2	R
	Copper	Cutting-off	153	60-80	CT	R
		Preparatory wet sharpening (with cup wheels)	153	36-46	CM1-CM2	R
Turning tools	Cemented carbides	Preparatory wet sharpening (with cup wheels)	153	36-46	CM1-CM2	R



Cont'd.

1	2	3	4	5	6	7
Turning tools	Cemented carbides	Finish wet sharpening (with cup wheel)	121	60-80	CM1-CM2	R
	"	Preliminary sharpening (with the periphery of the wheel)	121	36-56	CM1-CM2	R
	"	Finish sharpening (with the periphery of the wheel)	121	60-80	M3-CM1	R
	"	Lapping	121	180	C1	R
	Steel	Grinding of tool shank	3	36-46	C1-C2	R
	Steel, carbon and high speed	Hand lapping of cutting edges with sticks	26	250	C1-C2	R
	"	Sharpening	3	60	C1-C2	R
Turning tools for light work	"	Drill	3	56-60	C1-C2	R
Drill, for medium work	"	Drill	3	36-56	C2-C4	R
Drill, for heavy work	"	Drill	3	36-56	CM1-C1	R
Turning profile tools	"	Hand sharpening	3	56-60	CM1-C1	R
Twist drills	Steel, carbon, not hardened	Machine sharpening	3	56-60	CM1-CM2	R
	Steel, carbon and high speed	External cylindrical grinding	3	36-56	C2-C4	R
	"	Point thinning	3	60	C1-C2	R
	"	Cutting-off (dry)	3	36-56	CT1-CT2	R
	"	Cutting-off (wet)	3	60	CT1	R
	"	Centerless external grinding	3	60-80	CM2-C1	R
Twist drills (0.5-5 mm diameter)	"	Relief grinding	3	80	C1-C2	R
	"	Sharpening of cutting edges	26	100-150	CM1-CM2	R
	"	Centerless external grinding	3	56-60	C1-C2	R
Twist drills (5-15 mm diameter)	"	Grinding of taper shank	3	56-60	C1-C2	R
	"	Sharpening of cutting edges	3	56-60	C1-C2	R
	"	Centerless external grinding	3	56-60	C1-C2	R
Twist drills (15-30 mm diameter)	"	Centerless grinding of taper shanks	3	56-60	CM2-C1	R
	"	Grinding of flutes	3	56-60	C1-C2	R
	"	Sharpening of cutting edges	3	56-60	C1-C2	R
	"	Centerless external grinding	3	56-60	C1-C4	R
Twist drills (over 30 mm diameter)	"	Centerless grinding of taper shanks	3	56	CM2-C1	R
	"	Grinding of flutes	3	56	C1-C2	R
	"	Sharpening of cutting edges	3	56	C1-C2	R
	"	Point thinning (hand)	26	56	CM1-CM2	R
Twist drills with taper shanks	Steel, high speed	Preliminary surface grinding of faces	3	36	CT1	R
Universal joint knuckles	"	Finish surface grinding of faces	3	56-60	C2	R
	"	External cylindrical grinding of shoulders	3	60	CT2	R
	"	Centerless external grinding of journals	3	60	CT2	R
	"	Preliminary grinding of valve rod faces	3	25-36	CM2-C1	R
Valves, (auto-tractor engines)	"	Finish grinding of valve rod faces	3	36-56	CM1-CM2	R
	"	Chamfer grinding	3	46-60	C1-C2	R
	"	Preliminary centerless grinding	3	36-56	C2-CT1	R
	"	Finish centerless grinding	3	60	C1-C2	R
	"	Centerless grinding of radius and adjoining rod taper	3	80	DT1	R
Valve seats	Cast iron	Chamfer finish grinding	3	100	CT2	R
	"	Preliminary grinding	121	46	C1	R
	"	Finish grinding	121	150	CM2	R
	Alloy steel	Preliminary grinding	26	80	C2	R
	"	Finish grinding	26	150	CM2	R
	Stellite	Preliminary grinding	26	80	CM1	R
	"	Finish grinding	26	120-150	M3	R

Cont'd.

1	2	3	4	5	6	7
Vernier caliper jaws	Steel, hardened	Finish grinding	3	60-80	CM1-CM2	R
Welds	"	Chamfer grinding	3	56-60	CM2-C1	R
Wheel rims (automobile)	Steel	Weld surfacing	3	16-25	CT1-CT2	R
Wire for thread measuring	Silver steel, hardened	Rough grinding after welding	3	25	CT2-CT3	R
	"	External centerless preliminary grinding	26	60-80	CM2-C1	R
	"	External centerless finish grinding	26	120	CM1-CM2	R
Work rest blades for centerless grinders	Steel, high speed	Grinding of angular top of blade	3	16-60	CM1-CM2	R
Wrenches	Steel	Surface grinding (hand)	3	16-25	CT1-CT2	R
	"	Rough grinding of contour surfaces	3	25	CT2	R
	Malleable iron	Rough grinding of openings	121	16-25	CT1-CT2	R

Table 65

GRINDING WHEEL RECOMMENDATIONS FOR NON-METALLIC MATERIALS

Materials to be ground	Grinding operations	Altra-size	Grain size	Grade	Bond
1	2	3	4	5	6
Agate	Rough grinding	121	60-80	CM1-CM2	R
	Finish grinding	121	180-220	M3-CM1	R
Ashbestos-cement	Cutting-off	121	80-100	CM2-C1	R
Bakelite	Surface grinding	121	16-25	CM2-C1	R
	Cutting-off	121	16-25	C2-CT1	R
Bone	Hand surface grinding	121	26-46	CT	R
	External cylindrical grinding	121	26-46	C2-CT1	R
Bricks (vitrified)	Rough surface grinding	121	16-25	C2-CT1	R
	Finish surface grinding	121	26-46	CM2-C1	R
	Cutting-off	121	16-25	CT1-CT2	R
Cement	Hand rough grinding with sticks	121	25-36	CT1-CT2	R
	Surface grinding with the wheel face	121	25	CM1-CM2	R
	Cutting-off	121	16-25	CT1-CT2	R
Coal	Surface grinding with the wheel face	121	25	M3-CM1	R
	Surface grinding with the periphery of the wheel	121	26	CM1	R
	Centerless external grinding	121	36	CT1-CT2	R
	External cylindrical grinding	121	46	CM2-C1	R
	Cutting-off	121	16-25	CT2-CT3	R
Concrete	Cutting-off	121	16-25	CT1-CT3	R
Cork	Surface grinding	121	46	CM1	R
Decorative vitrified plates	Surface grinding of ends	121	16-25	CM1-CM2	R
	Cutting-off	121	16-25	CT1-CT2	R
Ebonite	External cylindrical grinding	121	36-46	CM1-CM2	R
	Cutting-off	121	36-46	CT1-CT2	R
Electrodes	Surface grinding	121	25-36	CM1-CM2	R
	Cutting-off	121	25	CT2	R
Fibre	Surface grinding with the wheel face	121	16	CM1-C1	R
	External cylindrical grinding	121	26	CM1-CM2	R
	Cutting-off	121	26-46	CT1-CT2	R
Fireproof materials	Surface grinding of ends	121	16-25	CM2-C1	R
	Cutting-off	121	25	CT1-CT2	R
Glass	Preliminary surface grinding	121	26-46	CT1-CT2	R
	Finish surface grinding	121	60-80	CM1-CM2	R
	External cylindrical grinding	121	26-46	CM1-CM2	R
	Internal grinding	121	56-60	CM1-CM2	R
	Face edging (optical glass)	121	100-180	CT1-CT2	R
	Face edging (show-window plates)	121	80-120	CT1-CT1	R
	Face edging (various glass parts)	121	80-100	CM2-C1	R
	Cutting-off (low speed - wet)	121	80-100	CM2-C1	R
	Cutting-off (optical glass)	121	120-180	CM1-CM2	R
Glass (lenses)	Edge grinding	121	220	CT1	R
Glass (mirrors)	Preliminary face edging	121	80	CM1-CM2	R
	Finish face edging	121	220	CM2	R
Glass (tubing)	External cylindrical grinding	121	16-40	CM1-C2	R
	Internal grinding	121	80-100	M3-CM1	R
	Cutting-off	121	80-100	CM2-C1	R
Glass (lumbers)	Facet grinding	121	120	CT2	R
		121	120-150	CT1	R



Cont'd.

1	2	3	4	5	6
Glass (windshield)	Preliminary face edging	301	80	C2	15
	Finish face edging	301	150—180	CT1	15
	Edging	101	100	CT2	15
Granite	Cutting-off (low speed-wet)	101	80—100	CM1-CM2	15
	Surface grinding with the wheel face	101	16—24	M3-CM1	15
	Surface grinding with the periphery of the wheel	101	36	CM1-CM2	15
	Grinding of irregularly shaped parts	101	36	C1-C2	15
	Cutting-off	101	24—36	CT2-CT3	15
	Cutting-off	101	24	CT1-C2	15
Gypsum	External cylindrical grinding	101	36	C2-CT1	15
Horns	Preliminary surface grinding	101	36	CM2-C1	15
Insulators	Finish surface grinding	101	36—60	CM1	15
	Cutting-off	101	36	CT1-CT2	15
Leather	Hand surface grinding	101	24—36	M3-CM1	15
Limestone	Surface grinding	101	36	CM2-C1	15
	Cutting-off	101	24	CT1-CT2	15
Marble	Rough surface grinding	101	12—16	CM2-C1	15
	Semi-finish surface grinding	101	16—24	CM1-CM2	15
	Finish surface grinding:				
	1st operation	101	36—46	CM2-C1	15
	2nd operation	101	80—100	CM1-CM2	15
	2nd operation	101	100—200	CM1-CM2	15
	External cylindrical preliminary grinding	101	16—24	C1-C2	15
	External cylindrical finish grinding	101	36—46	CM1-CM2	15
	Cutting-off	101	24	CT1-CM2	15
	Cutting of wide grooves	101	24	CT1-C2	15
	Cutting of narrow grooves	101	46—60	CT2-CT3	15
Plastics	External cylindrical grinding	101	24—36	CM1	15
	Surface grinding with the wheel face	101	24—36	CM2-C1	15
	Surface grinding with the periphery of the wheel	101	24—36	CM1-CM2	15
	Cutting-off	101	16—24	CT1-CT2	15
Poreclain	Preliminary surface grinding with the wheel face	101	16—36	CM1-CM2	15
	Finish surface grinding with the wheel face	101	56—80	CM1-CM2	15
	Centerless external grinding	101	36—46	CM1-CM2	15
	External cylindrical grinding	101	36—46	CM1	15
Quartz (fused)	Cutting-off (wet)	101	36—46	C2-CT1	15
	External cylindrical grinding	101	36—46	CM2-C1	15
	Surface grinding	101	36	CM1-CM2	15
Roof slate	Cutting-off	101	36—46	CT1-CT2	15
	Surface grinding	101	36—46	CM1	15
	Profile grinding	101	36—46	CM1	15
	Cutting-off	101	24	CT2-CT3	15
Rubber rolls for typewriters	External cylindrical grinding	101	24	CM1	15
Slate	Cutting-off	101	16	CT1-CT2	15
Sandstone	Surface grinding	101	46	CM2	15
	Cutting-off	101	24—36	CT1-CT3	15
Stones (artificial)	Surface grinding with the wheel face	101	16—24	CM1-CM2	15
	Surface grinding with the periphery of the wheel	101	24—36	CM2-C1	15
	Cutting-off	101	16—24	CT2-CT3	15
	Rough surface grinding	101	36—46	CT1-C2	15
Tile	Cutting-off (dry)	101	24	CT1	15
	Cutting-off (wet)	101	16—24	CT1-CT2	15
Wood (hard)	Centerless external grinding	101	24—36	CM1-CM2	15

STORAGE AND BALANCING OF GRINDING WHEELS

Special attention should be paid to the careful unpacking of the wheels. When unpacked, the wheels should be properly checked to make sure that no damage has occurred during the transit. Before checking it is necessary to clean and dry the wheels. As an additional precaution every wheel should be sounded before mounting with a mallet to reveal any damage caused to the wheel in transit. A clear sound (except in the case of resinoid and rubber bonded wheels) proves the wheel is undamaged.

It should be borne in mind that grinding wheels are very fragile and may be easily damaged by undue handling which may later lead to wheel bursts.



The wheel storage place should be dry and of fairly even temperature. In storage the wheels should be safeguarded against damaging knocks.

Small wheels are best stored in boxes or drawers and larger wheels in shelves.

All wheels over 250 mm in diameter pass a balancing test at the manufacturers' plant. However, it is strongly recommended to run every wheel at full working speed on its machine prior to commencing work. This test as well as the mounting should be carried out by a qualified and reliable workman. Nobody should be allowed to stand in front of the machine during the test. Wheel guards must be securely fixed prior to test.

Peripheral speeds of the wheels are determined depending on the shape of the grinding wheel, the type of bond and the mode of feed used in the operation. They should not exceed the figures shown in Table 66.

Maximum permissible peripheral speeds
(GOST 3881-53)

Table 66

Shape of abrasives	Type symbol	GOST number	Feed of abrasive or work	Peripheral speed, m per sec	Vitreous bond	Resin bond	Rubber bond
1	2	3	4	5	6	7	8
Wheels							
Straight wheels with square profile	III	2424-52	Hand	30	40	35	
	III	..	Mechanical or automatic	35	40	35	
Straight wheels specially made for high speed grinding on special machines for rough grinding operations	III	..	Hand	42	50		
	III	..	Mechanical or automatic	50	50	42	
	III	..	Mechanical or automatic	50			
	III	..	Mechanical or automatic	55	55		
Thread cutting and thread grinding	2 II	..					
Straight wheels with 40° taper (two sides)	3 II	..		35	35		
Straight wheels with 45° taper (one side)	3 II	..		30	35		
Straight wheels with small taper (one side)	III	..					
Straight wheels recessed, one side	III	..		35	35		
Straight wheels tapered recessed one side	III	..					
Straight wheels corrugated	III	..	Hand, mechanical or automatic		35		
Steel-backed straight wheels	III	..					



Cont'd.

1	2	3	4	5	6	7
Cutting-off wheels	2U	2424-52	Hand or mechanical		50	50
Cylinder wheels	11K, 21K	..	Mechanical	25	30	
Straight cup wheels	11H	..	Hand	25	30	
Flaring cup wheels	11K	..	Mechanical	30	35	
Straight cup wheels	11H	..				
Flaring cup wheels	11K	..	Hand	25	30	
Dish wheels	1 T, 2 T	..	Mechanical	30		
Dish wheels	3 T	..	or automatic			
Grinding wheels for needles	11	..	Mechanical	25		
Steel centered wheels	M	..	Mechanical		40	
Mounted wheels and points						
Cylindrical	11H	2447-52	Hand	25	25	
Angular	11N	..				
60° Taper	11G	..				
Arched	11A	..				
Taper with a rounded top	11K	..				
Spherical	11H	..				
Spherical with a cylindrical side surface	11H1	..				
Sticks						
Square	BRB	2456-52	Mechanical or automatic	20	20	
Round	BRP	..				
Honing	11N	..				
Honing	BRB	..				
Segments						
Flat	CH	2464-52	Mechanical or automatic	30	30	
Convex-concave	1 C	..				
Concave-convex	2 C	..				
Convex-flat	3 C	..				
Flat-convex	4 C	..				
Trapezoidal	5 C	..				

Note. Permissible peripheral speed for diamond impregnated wheels of different bonds and shapes — 30 m per sec.

Grinding wheels operate at very high speeds. Owing to this, in case of unbalance of the wheels and flanges, great dynamic forces may arise, setting up vibrations of the machine and thus causing chatter marks on the work. This condition steadily progresses as the bearings are affected.

Unbalance of wheels and flanges necessitates a frequent retuning of the wheels, which results in increased wear of the wheels and truing tools.

Furthermore, unbalance of wheels and flanges is very dangerous as it may lead to wheel bursts.

Consequently, in order to obtain a good surface finish on the work to be ground, to avoid an undue wear of the spindle bearings and to avoid possible accidents it is absolutely necessary to properly balance the wheels and their flanges prior to mounting on the machine.

At the manufacturer's plant all wheels of 250 mm in diameter and over, having a width from 8 mm up, are subjected to static balancing.

There are 4 different groups of balancing. Table 67 shows the permissible limits of unbalance according to the diameter and width of the wheel.



Table 67

Permissible unbalance, according to four groups of balancing
(GOST 3060-45)

Width of wheel in mm	Groups of unbalance	External diameter in mm									
		250	300	350	400	450	500	600	650	750	1100
		Permissible unbalance in grams									
up to 25	1	7	9	10	12	15	15	18	20		
	2	20	25	30	35	35	40	50	55		
	3	30	35	40	45	50	60	70	75		
	4	45	55	65	75	85	95	110	115		
from 25 up to 50	1	9	12	12	15	18	18	20	25	30	40
	2	25	30	35	40	45	50	60	65	75	110
	3	35	45	50	55	65	75	85	90	105	150
	4	60	70	80	90	100	115	135	145	170	250
from 50 up to 75	1	10	12	15	18	20	25	25	30	35	45
	2	30	35	40	45	50	60	70	75	85	105
	3	40	50	60	65	75	85	100	110	125	150
	4	65	80	90	105	120	135	160	175	200	250
from 75 up to 100	1	12	12	15	18	20	25	30	30	35	50
	2	35	40	45	50	60	70	80	85	100	115
	3	45	55	65	75	85	95	110	120	140	165
	4	75	90	105	120	135	150	180	195	220	325
from 100 up to 125	1	13	15	18	20	25	30	35	35	40	55
	2	35	45	50	55	65	70	85	95	105	130
	3	50	60	70	80	90	100	120	130	150	180
	4	80	100	115	130	145	165	200	210	245	350
from 125 up to 150	1	15	18	20	25	25	30	35	40	45	60
	2	40	50	55	60	70	80	95	105	115	140
	3	55	70	80	90	100	110	130	140	165	200
	4	90	100	120	150	160	180	210	230	260	320
from 150 up to 200	1	18	20	20	25	30	35	40	40	45	55
	2	45	55	60	70	80	90	105	110	130	155
	3	60	75	85	100	115	130	150	160	185	225
	4	100	120	140	160	180	200	240	260	300	360

At the works of the manufacturers the balancing of the wheels is carried out according to different groups depending on the grinding process in view, i.e. wheels with a grain size No. 120 and finer are balanced according to group No. 1, wheels with a grain size Nos. 60, 80 and 100—according to group No. 2, wheels with a grain size No. 36 and No. 46—according to group No. 3, and wheels with a grain size Nos. 12, 16, 20, and 24—according to group No. 4.

ABRASIVE PAPERS AND CLOTHS

Abrasive papers and cloths are a kind of abrasive tool made of good quality paper or cloth backing to one side of which abrasive grains are glued in a uniform layer.

Abrasive papers and abrasive cloths are used for the rubbing down of filler, paint and lacquer surfaces and for general utility work.



For the manufacture of backing, extra strong kinds of paper or cloth, such as coarse calico, nankeen, diagonal, serge, etc., are used. Abrasives with a paper backing are called "abrasive paper" and those with a cloth backing are called "abrasive cloth."

The paper used for the backing should have a high tensile strength, an adequate density and a minimum elongation. One square meter of such paper has a basic weight from 100 to 200 grams. The density of the paper is selected according to the job in view.

To increase the mechanical strength of the cloth the latter is subjected to special treatment, which consists in coating one side of the cloth with a thin and dense layer of a special compound.

Abrasive cloth has an extensive field of application. It is chiefly used for finishing metals, wood, leather, bones and other materials. It is also applied for cleaning rust, for taking off oil paint, lacquer and enamel, as well as for rubbing down fillers.

Coarse grained abrasive cloth is used for roughing and fine grained cloth— for finishing operations.

Flint, glass, electrocorundum, silicon carbide (green and black), crushed and cleaned from extraneous materials, are used for the manufacture of abrasive papers and cloths.

Depending on the kind of abrasive materials used the abrasive papers and cloths are subdivided as follows:

Flint (symbol—Kp).

Glass (symbol—G).

Electrocorundum (symbol—Э).

Silicon carbide green (symbol—K3).

Silicon carbide black (symbol—K4).

Flint abrasive paper and cloth is mainly used for veneer, leather shoes, etc. Glass abrasive paper and cloth is used for wood, felt, parts of electrical machinery, etc.

Electrocorundum papers and cloths are used for metals with a high tensile strength such as steel, malleable iron, hard bronze, etc.

Silicon carbide papers and cloths are used for brittle or very soft materials, such as iron, bronze, aluminium and plastics.

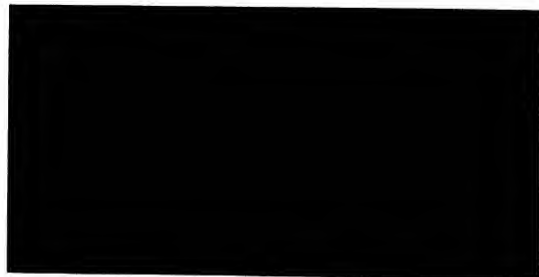


Fig. 26



Fig. 27

Abrasive papers and cloths are supplied in rolls and sheets (figs. 26, 27).

Abrasive cloth is manufactured in the following sizes:

Sheets— 210 × 285; 615 × 725; 635 × 725; 660 × 725; 575 × 775; 595 × 775; and 615 × 775 mm.

Rolls—width 725 and 775 mm;

length 30 m when the grain size is No. 36 and coarser;

length 50 m when the grain size is No. 46 and finer.

Abrasive paper is manufactured in the following sizes:

Sheets— 720 × 780; 620 × 900 mm.

Rolls—width 720 and 900 mm;

length 30 m when the grain size is No. 36 and coarser;

length 50 m when the grain size is No. 46 to No. 100;

length 100 m when the grain size is No. 120 and finer.

In accordance with GOST 5009-52 abrasive cloth is manufactured with the following grain sizes as given in Table 68.

Table 68

Type of backing sheet	Backing	Grain sizes																
		10	12	15	18	22	28	36	46	60	80	100	120	150	180	220	280	320
Rolls																		
P 725	ET*																	
P 725	II																	
P 725	CT																	
Sheets																		
0210X 0225	ET																	
0225	II																	
0225	CT																	

* ET— Industrial coarse calico; II— Nanken; CT— Industrial serge.



Abrasive paper is manufactured with the following grain sizes, as given in Table 69.

Table 69

Type and size	Backing (weight)	Grain sizes											
		36	46	60	80	100	120	150	180	220	240	280	320
Sheets A 720	100—120 gr per sq.m												
Rolls P 720													
" P 900													
Sheets A 720	150—200 gr per sq.m												
Rolls P 720													
" P 900													

Each roll or sheet is marked in a legible manner with:
the manufacturer's trademark;
symbol, type and size;
backing;
abrasive material;
grain size.

Example:

a) An abrasive cloth with a backing of industrial coarse cutlery and having electrocorundum as abrasive material, with a grain size No. 46, size of rolls 775 mm × 50 m, is marked as follows:

"BTP 775 × 50 46".

b) An abrasive cloth with a backing of nankeen in sheets 775 × 575 mm having flint as abrasive material, with a grain size No. 60, is marked as follows:

"HCT 775 × 575 60".

Abrasive cloth in sheets is packed into batches of 100 sheets each. The batches, in their turn, are packed into bales. With No. 36 grain size and coarser the bales are made up of 8 batches, with grain size Nos. 46, 54 and 60—of 20 batches and with grain size No. 80 and finer—of 30 batches.

The rolls are wrapped in thick paper. The abrasive papers and cloths should be kept in dry storage places at a temperature from 5 to 25 °C and at a relative humidity of 50—60%.

The selection of abrasive paper and cloth is determined by the operation in view, material to be polished or ground, and method of grinding (by hand or machine).

Abrasive papers and cloths with grain size Nos. 24, 36 and 46 are used for removing old layers of paint, glue, varnish, burr, rust and for rubbing down fillers.

Abrasive papers and cloths with grain size Nos. 60, 80 and 100 are applied for preliminary grinding operations.

Abrasive papers and cloths with grain size Nos. 120, 150, 180, 220, etc. are used for finishing operations.



When making microsections, the following grain sizes of abrasive papers and cloths are used:

- Nos. 60-80- for rough grinding;
- Nos. 120-140- for preliminary grinding;
- Nos. 220-280- for finish grinding;
- Nos. M 28-M 20- for superfinishing.

WATERPROOF SILICON CARBIDE PAPER

Waterproof silicon carbide paper is widely used for wet grinding operations.

Waterproof silicon carbide paper is an abrasive tool, consisting of waterproof paper backing to the surface of which the best quality silicon carbide powder or micropowder free from extraneous material is glued by means of a waterproof bond.

Waterproof paper is supplied in sheets of 310 × 230 mm having the following grain size: 100, 120, 150, 180, 220, 240, 280, 320 and M28.

Each sheet of waterproof paper is marked with the manufacturer's trade mark, type of paper and grain size.

Waterproof paper is packed into batches containing 50 sheets each. These batches, in their turn, are made up into bales and wrapped in paper. The bales are made up of 10 batches.

Depending on its grain size the waterproof paper is used for the following operations:

No. 100 grain size- for rubbing down the upper layer of fillers on coarse surfaces (castings, etc.);

Nos. 120-150- for rubbing down oil fillers;

Nos. 180-220- for polishing oil prime coatings on steel and wood;

Nos. 240-280- for polishing paint layers;

Nos. 320-M 28- for superfinishing nitro-varnish coatings.

Waterproof paper is particularly useful for polishing surfaces coated with nitro-varnish.

FIBRE ABRASIVE DISCS

Fibre abrasive discs consist of abrasive cloth, mostly coarse grained, glued to a fibre disc.

Fibre abrasive discs can be run at comparatively high peripheral speeds of 35 to 45 m per sec.

For the manufacture of these discs high quality abrasive materials, special sorts of cloth, fine fibre with a thickness of 0.3-0.5 mm and highly viscous glues are used.

Fibre discs are mostly made with a diameter of 230 mm and a hole of 23 mm in diameter.

Fibre abrasive discs are mainly made of electrocorundum with grain sizes Nos. 16, 24, 36, 46, and in rare cases No. 60 and No. 80. Silicon carbide with grain size Nos. 16, 24 and 36 is also used for the manufacture of fibre discs.

Fibre discs are marked with the manufacturer's trademark and grain size. Fibre discs are packed in batches of 100 pieces each.

Fibre discs are widely used for weld surfacing prior to painting.



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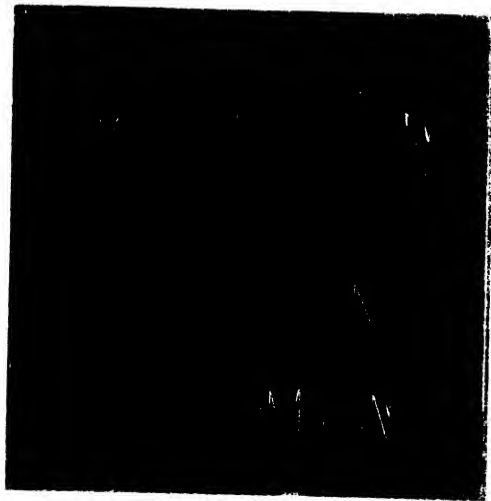
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STANKOIMPORT

26

MOTION
PICTURE
EQUIPMENT



VSESOJUZHNOYE EXPORTNO-IMPORTNOYE OBJEDINENIYE

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otion picture equipment and accessories manufactured in the U.S.S.R. embody the latest achievements in this field, and are perfect in design and workmanship.

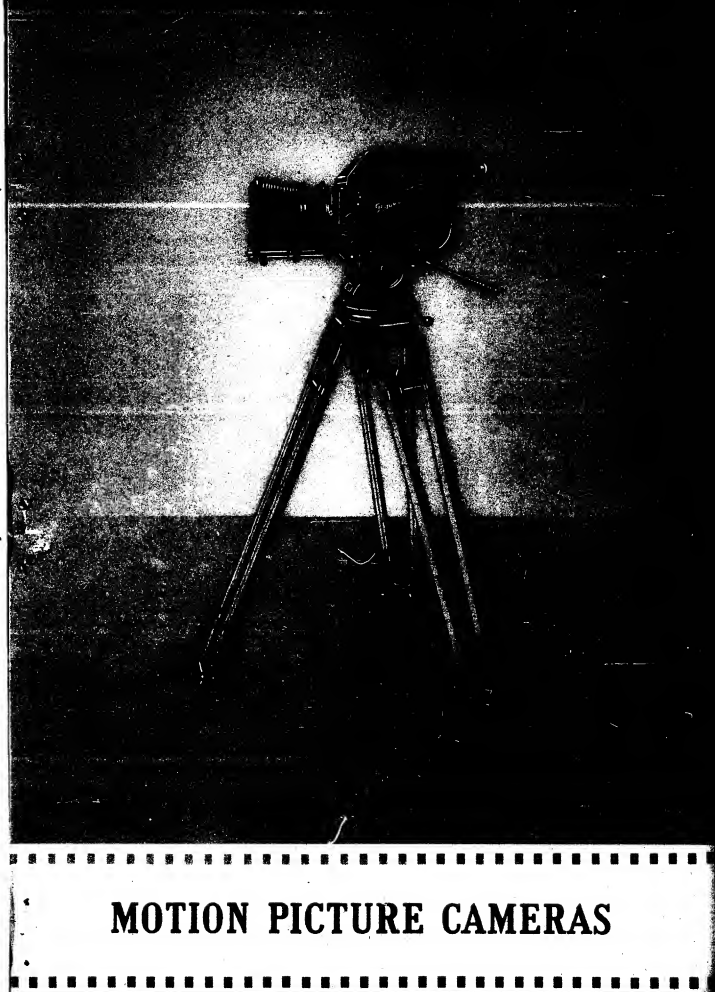
Superior materials, modern design and skilful workmanship ensure outstanding performance and durability of the motion picture equipment and accessories.

High operating merits are combined with a finely-styled outer appearance, excellent finish, light weight and convenience in handling.

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**"RODINA" (KCX) 35-mm MOTION PICTURE CAMERA
FOR NEWSREEL AND EXPEDITIONARY FILMING**

The "Rodina" Motion Picture Camera (Fig. 1) is designed to perform newsreel and expeditionary filming with black-and-white as well as colour 35-mm film.



Fig. 1. Motion Picture Camera "Rodina"

New design of the intermittent film mechanism ensures high-precision registration of separate picture frames within the film channel, and allows use of the camera for special and trick filming.

Special design of the friction clutch permits use of magazines of 120-metres and 300-metres film capacity (Fig. 2). Quick change lens mounts provide ease and facility in the interchange of lenses.

Picture composition and visual control during the filming process are achieved by means of a magnifying view-finder.

Control of filming speed is provided by a tachometer with dial divisions in picture-frames per second.

SPECIFICATIONS

Film size 35 mm
 Path of film travel within camera . . . in three planes
 Film gate dimensions 16 X 22 mm
 Shutter aperture angle 0° to 160°
 Magazines single compartment type of 120 and 300-meter capacity
 Film length and picture-frame counter drum type with zero setting



Fig 2. Motion Picture Camera "Rodina" with 300-metre capacity magazines



Fig 3. Motion Picture Camera "Rodina", right-side view

Camera-to-tripod attachment by means of 1/4" screw
 Interlocking devices to effect stoppage in case of film breakage, termination of film roll, or slackening of film tension
 View-finder parallaxless magnifier of 5.5-time magnifying power
 Set of coated photographic lenses in bayonet mounts 28, 35, 50, 75 and 100-mm focal length

Minimum focal length of photographic lens 28 mm
 Focusing of photographic lens by magnified image on view-finder screen; by focusing scales
 Tachometer readings 8, 16, 24, 32 and 48 picture frames per second
 Normal operation temperature conditions from +40° to -25° C
 Power drive 12 V, 60 W D. C. electric motor
 Camera run reversible
 Exposure speed 8 to 48 picture frames per sec
 Noise level 50 + 2 db
 Overall dimensions of camera in operating position with electric motor (length X height X width) . . . 650 X 280 X 260 mm
 Weight of camera (less tripod and film) 14 kg with hand drive
 16.2 kg with motor drive
 Weight of camera set in carrying cases (less storage battery) 35 kg
 Weight of storage battery 11.5 kg



**"MOSKVA" (KC-32) 35-mm MOTION PICTURE CAMERA
FOR SYNCHRONOUS FILMING**

The "Moskva" Camera (Fig. 4) is designed to perform synchronous filming of images and simultaneous sound-track record-



Fig. 4. Motion Picture Camera "Moskva"

ing by means of a recorder on 35-mm film and is adapted for studio and outdoor work.

Specially silenced to eliminate mechanical noises the camera permits simultaneous sound-recording, provided the microphone is stationed not less than 1 metre from the camera front.

High-precision performance of the intermittent film mechanism allows use of the camera for special (trick) filming.

Focusing of the photographic lens is achieved by ground glass, film, or focusing scales; simultaneous compensation of parallax and focusing of the view-finder lens are automatic.

A left-side view of the camera is given in Fig. 5, and a diagram of film threading in Fig. 6.

The camera is provided with an interlocking device to shut off the motor when normal operation of the camera is interfered with.

On-and-off switching of the camera is achieved by means of a switch mounted on the power-supply line.

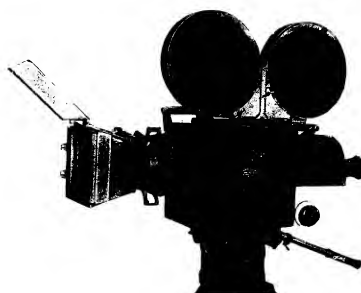


Fig. 5. Motion Picture Camera "Moskva", left-side view

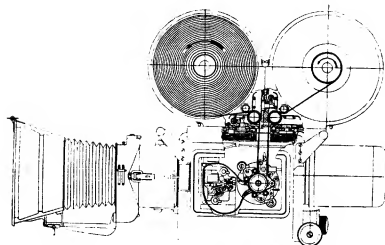


Fig. 6. Film Threading Diagram for "Moskva" Camera

Camera power supply is fed through a 220 V autotransformer from 220 or 380-volt 50-cycle A. C. mains. Voltage variations in the mains are compensated by a regulator switch in the autotransformer.

Lighter weight and smaller overall dimensions add greatly to the camera's operating merits over other known synchronous motion picture cameras.

Handy location of all operation and control elements on the back and right side-walls of the camera, and the design of the easily removable parts (intermittent film mechanism, sprocket assembly, etc.) as well as the interchangeability of the detachable parts in all cameras of this type ensure operation efficiency and convenience in inspection and cleaning.

SPECIFICATIONS

Film size	35 mm
Path of film within camera	in one plane
Exposure speed	24 picture frames per sec
Noise level	not over 29 db
Accuracy of picture frame registration in the film channel	0.008 mm
Film gate dimensions	16 × 22 mm
Shutter aperture angle	0 to 170°
View-finder	detachable, with automatic parallax compensation and lens focusing
Magazines	single compartment type, in pairs of 300-metre capacity each
Set of coated lenses	28, 35, 50, 75, 100 mm focal length
Minimum focal length of photographic lens	24 mm
Power drive	three-phase 220 V, 150 W, 1,500 r.p.m. synchronous motor
Speed of reduction gear shaft	1,440 r.p.m.
Camera run	reversible
Interlocking devices	to effect stoppage in case of film breakage, slackening of film tension or idling of intermittent film mechanism
Focusing of photographic lens	by ground glass, by film, by focusing scales
Camera to tripod attachment	by means of 3/8" screw
Overall dimensions of camera in working position	1,120 × 585 × 470 mm
Distance between optical axis and base of camera housing	169.7 mm
Weight of camera (less tripod and film)	62 kg
Weight of camera set in carrying cases	130 kg

The motion picture camera is supplied with the following accessories:

Focusing magnifier; light-protective device with filter-holder; 6 magazines of 300-metre capacity; belt tensioning and switching mechanism; carrying cases for magazines and motor; switch. Photographic lenses (PO coated type) with 1:2 relative aperture and focal lengths of 28, 35, 50, 75 and 100 mm (5 lenses). IM-35 three-phase, 220 V, 150 W electric motor.

7C-II View-finder.

KAT-24-I auto-transformer in jacket.

Set of tools.

Description of camera and instructions for maintenance.

Carrying cases (Fig. 7).



Fig. 7. Motion Picture Camera "Moskva", packed in carrying cases

The motion picture camera "Moskva" is additionally supplied with a ИИСК-2 tripod on special order.

KC-50 B 35-mm MOTION PICTURE CAMERA FOR NEWSREEL FILMING

The KC-50 B 35-mm Motion Picture Camera (Fig. 8) is designed for filming of newsreel and documentary films.

The camera has 3 interchangeable lenses mounted on a revolving turret, and a rotating view-finder; the focal lengths of the view-finder lenses are proportionate to their corresponding



Fig. 8. KC-50 B Motion Picture Camera

photographic lenses. Focusing of the lenses is achieved by means of a distance collar on each of the lens mounts.

A spring-drive mechanism enables to conduct continuous filming up to a 16.5-meter film run.

Filming can be performed with the camera being hand-held or with the camera set on a tripod.

The camera is equipped with a hand drive; one revolution of the hand crank corresponds to the exposure of eight picture frames.

The camera has a special carrying case for convenient transportation.

Accessories and necessary tools are provided with the camera.

SPECIFICATIONS

Number of photographic lenses	3
Lenses relative aperture	1:2
Focal length of lenses	35, 50 and 75 mm
Reel capacity	30-34 m
Operating speed	8, 12, 16, 24, 32 exp. per sec
Film length counter division	0.5 m
Shutter	of the constant 180° angular aperture allows the following exposures:
	at 8 frames per sec . . . 1/16 sec
	" 12 " " " . . . 1/12 sec
	" 16 " " " . . . 1/8 sec
	" 24 " " " . . . 1/6 sec
	" 32 " " " . . . 1/5 sec
Distance range	for each lens is from 1 m to infinity.
Overall dimensions of camera	285×250×450 mm
Weight of camera	12 kg

IIIKC-2 CAMERA TRIPOD

The IIIKC-2 Tripod (Fig. 9) is designed for motion picture cameras of various types for studio and outdoor filming.



Fig. 9. IIIKC-2 Tripod

The tripod is adapted for use on different soils and rough surfaces, in premises with smooth and hard floors, as well as on special vehicles and trucks.

The tripod comes in a set, and the use of its components in different combinations gives the camera a height ranging from 300 mm to 1,800 mm.



Fig. 10. Tripod Head with Auxiliary Platform

The set includes:

- Tripod head (Fig. 10)
- Auxiliary platform (Fig. 10)
- Normal length tripod legs (Fig. 11)
- Short length tripod legs (Fig. 11)
- Low mount supports (Fig. 11)



Fig. 11. Tripod Legs

The tripod head allows vertical and horizontal panoraming. Special levers are provided to regulate the friction devices of the tripod head. Vertical panoraming is facilitated by spring compensators set in the tripod head.

Control of the tripod motions is achieved by means of a single handle (bar). For convenience of operation the handle may be attached to the right or left side of the tripod head, telescoped, and swung into any desired position.

Two lock levers, one for vertical tilt, the other for horizontal, are provided to secure the tripod head in any operating position.

The motion picture camera is secured to the tripod head with a $\frac{3}{8}$ " screw or by means of a special dovetailed auxiliary platform (Fig. 10).

The tips of the oaken telescopic tripod legs are fitted with double-spurred shoes. When telescoped, the legs are fitted in position by a double-action clamp.

For convenience in transportation the tripod set is provided with jackets.

SPECIFICATIONS

Height of tripod may be varied:

main tripod	1,000—1,800 mm
small tripod	600—1,050 mm
low mount support	300—360 mm

Motions of the tripod head:

horizontal motion	endless over 360°
downward tilting	to any angle up to 45°
upward tilting	to any angle up to 35°

Tripod is designed to support

cameras weighing up to 100 kg

Weight of tripod:

head	11.5 kg
main tripod	10.5 kg
small tripod	9.3 kg
support	5.2 kg
auxiliary platform	2.3 kg
overall weight of tripod	38.8 kg

IIC-3 CAMERA TRIPOD

The IIC-3 Tripod (Fig. 12) is designed for both silent cameras and cameras provided with a sound recorder in filming indoors and outdoors.

The camera is secured to the tripod by means of an auxiliary platform and a special clamping device.

The tripod set includes:

An inertia type head with an worm and gear device.

Normal length legs.

Short length legs.

Leg-supporting shoes to ensure stability of the tripod on smooth and hard surfaces.

Two tripod jackets.

Two sets of tripod legs allow the wide height-range from 0.5 to 1.8 metres.

The tripod head is equipped with a device ensuring inertia, worm and gear and free motions.

Besides free and variable inertia motion, the inertia-type head possesses two worm and gear drives for each.



Fig. 12. IHC-3 Tripod

A special brake regulates the movement and stoppage of the camera during inertia panoraming.

The tripod head design permits horizontal circular panoraming (360°) and vertical panoraming with an up-and-down range

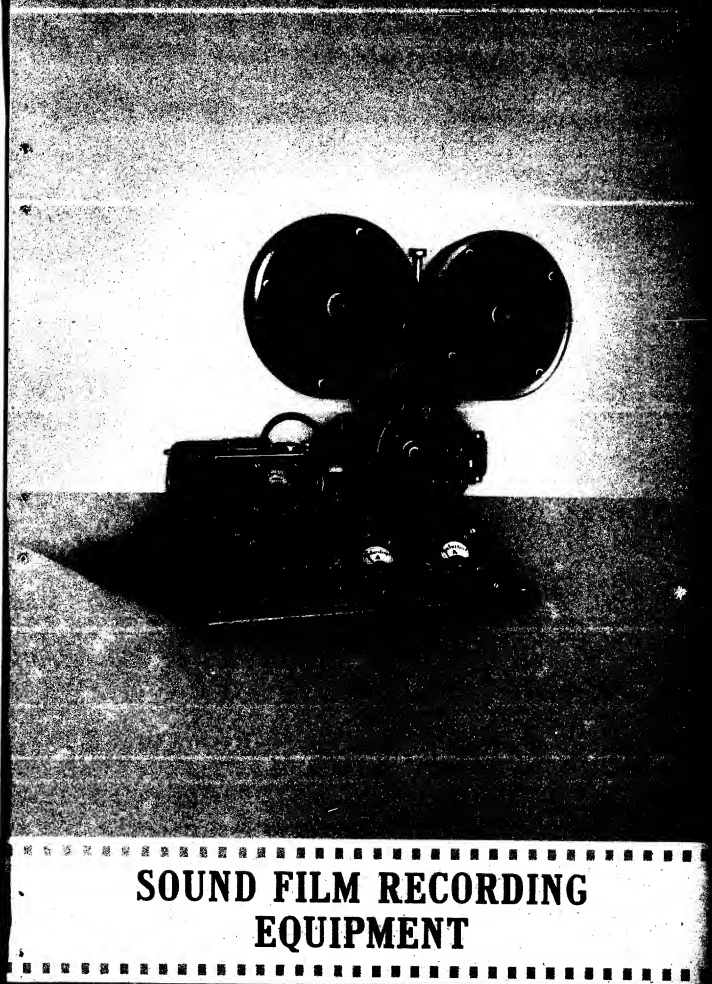


Fig. 13. IHC-3 Tripod Head

of 40° each. The design ensures easy and quick adjustment of the tripod head to the legs.

The tripod is adapted to support cameras weighing up to 30 kg. Finely styled, light-inweight, packed in compact jackets, the tripod is convenient for transportation and storage.

Weight of the tripod — 18 kg.



SOUND FILM RECORDING EQUIPMENT



K3IIV PORTABLE SOUND FILM RECORDER

The K3IIV Portable Sound Film Recorder is designed to perform synchronous sound recording on 35-mm film by the photographic method in expeditionary conditions.

Several models of portable sound recorders are available at present for recording on normal or double-area sound tracks, and enable connection of the recorder to different supply lines under varying local conditions.

The table below includes brief characteristics of the models available and their sets.

The K3IIV Sound Recorder contains:

33II Recording Device (Fig. 14) which is designed for recording on 35-mm film by means of the variable area method. Recording is of normal or push-pull noiseless sound track type of standard or double area.

High uniformity of film travelling speed is ensured by a rotary speed stabilizer.

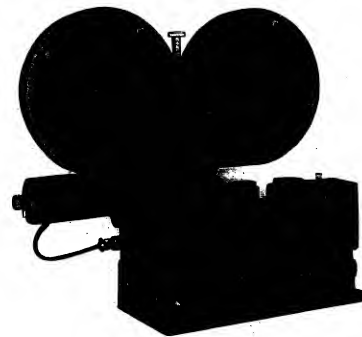


Fig. 14. 33II Recording Device

The light modulation system of the recording device allows for recording with white and ultra-violet light.

High-efficiency recording is provided by the frequency range of the device.

The recording device is mounted and secured in a solid carrying case convenient for transportation.

Removal of the easily detachable case cover and installation of the motor and magazines are sufficient to bring the device into instant use.

Overall dimensions of recording device (height \times length \times width) 600 \times 720 \times 300 mm
Weight of recording device 54 kg

1 V 50-A Preamplifier (Fig. 15), which mixes and preamplifies incoming signals from two microphones.

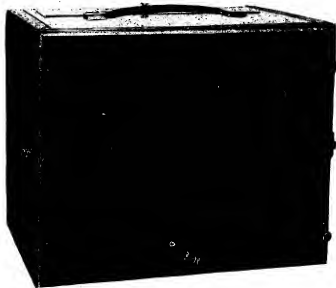


Fig. 15. 1 V 50-A Preamplifier

The amplifying range of the device permits use of microphones of the lowest response.

The provided correction range of the frequency characteristics in the preamplifier and the main amplifier covers recording requirements in the studio and outdoors.

The electromechanical properties of the volume indicator mounted in the preamplifier enable to maintain complete visual control of the volume of signals recorded.

The electrical characteristics of the transformers in the preamplifier ensure a remarkably low noise level of the amplifying channel, and do not, therefore, limit the dynamic range of the recording.

The preamplifier is mounted in a metal portable case and is ready for use by a simple connection of its cables. Removal of the easily detachable front cover gives access to the control board.

Overall dimensions of preamplifier (height \times length \times width) 305 \times 350 \times 293 mm
Weight of preamplifier 15 kg

12 V-3 Main Amplifier (Fig. 16), which achieves the subsequent amplifying of signals coming in from the preamplifier and makes provisions for the possibility of compression of the output volume.

The main amplifier is mounted in a metal cabinet containing frames for recorder and intermediate amplifiers. Clamps on the cabinet side walls are provided to secure the cabinet in a truck.

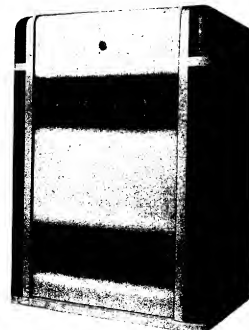


Fig. 16. 12 V-3 Main Amplifier

The cabinet front cover is easily removable to give free access to the tubes. The frame is mounted on loops, and special hinges afford free access to the amplifier parts.

Overall dimensions of the amplifier (height \times length \times width) 712 \times 535 \times 365 mm
Weight of amplifier 41 kg

Power-supply Device, which supplies motion picture camera and sound-recorder electric motors with three-phase current and feeds D. C., high and low voltage circuits of the preamplifier, the main amplifier and the exposure lamp of the sound recorder. Four types of power supply devices — KIICV-1, KIICV-2, KIICV-3 and KIICV-4 are available. Regardless of the type of Power-supply device, stabilized supply is ensured for D. C. circuits of high- and low voltage.

a) The KIICV-2 Power-supply device (Fig. 17) is operated on high-capacity storage batteries and is used where no A. C. mains are available.

50-cycle frequency of the three-phase current is constantly maintained irrespective of battery discharge in the bounds of normal operating conditions. Battery capacity provides for 12 hour operation without reloading.

All parts of the equipment for converting and distributing the electric power supplied from the batteries are mounted in a durable aluminum frame.

To provide transportation convenience the frame is secured in a solid case of special design. Inspection and adjustment of the rotary converters is facilitated by the sliding guides on which they are mounted.



Fig. 17. KIICV-2 (KIICV-4) Power-supply Device

The side walls of the case may be swung aside to allow free access to the switch panels.

Overall dimensions of the power-supply device (height \times length \times width) 430 \times 605 \times 330 mm
Weight of device 55 kg

b) The KIICV-4 Power-supply device is intended for the same purposes as the KIICV-2 device with the difference that the alternating current it converts is of 60-cycle frequency.

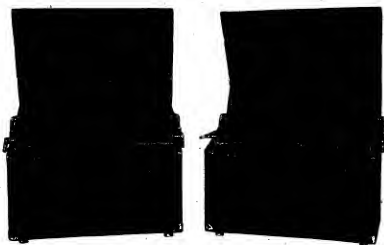


Fig. 18. KIICV-1 (KIICV-3) Power-supply Device

c) The KIICV-1 Power-supply device (Fig. 18) is intended for use when the K3IIV sound recorder is supplied from 220 or 380 V three-phase 50-cycle mains.

To make it portable the KIICV-1 power-supply device is divided into two functionally related parts. The first contains the general stabilizer and exposure lamp rectifier, the second — the power-supply rectifier of the amplifying channel.

Both parts are of similar construction, styled of duraluminum frames, mounted in solid cases provided with hinged covers.

Overall dimensions of each of the parts (height \times length \times width) . . . 430 \times 615 \times 300 mm
Weight of device 94 kg

d) The KIICV-3 Power-supply device is intended for the same purposes as device KIICV-1, with the difference that it operates on 60-cycle frequency mains.

1 Y-101 Public Address Amplifier (Fig. 19), which intensifies orders relayed from the camera-crew during mass outdoor filming.



Fig. 19. 1 Y-101 Public Address Amplifier

The public address amplifier is styled as a light metal chassis covered with a casing. The hinged rear cover of the casing provides free access to the tubes.

Overall dimensions of the amplifier (height \times length \times width) 245 \times 312 \times 190 mm
Weight of amplifier 6 kg

25 A-1 Loudspeaker (Fig. 20), which reproduces instructions from the camera-crew during mass outdoor filming.

The loudspeaker consists of a head provided with a permanent magnet and mounted in a solid wooden case with a grip for transportation. A metal grid protects the head against mechanical damages and a hood of light fabric keeps out the dust.

Overall dimensions of loudspeaker (height \times length \times width) 430 \times 432 \times 201 mm
Weight of loudspeaker 12 kg

TABLE
of K311V Sound Recorder Sets

Model		Main units of set							
Symbol	Characteristics of the model	Recording device	Preamplifier	Main amplifier	Power supply device	Public address amplifier	Loudspeaker	Microphone	Communication phones
K311V-2	Basic type. Designed for supply from storage batteries.	33H-1/15	1Y 50-A	12Y-3	K11CY-2	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-3	Designed for supply from A. C. mains	33H-1/15	1Y 50-A	12Y-3	K11CY-4	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-4	Recording device adapted to record sound tracks of double area. Power supply from storage batteries.	33H-2	1Y 50-A	12Y-3	K11CY-2	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-5	Recording device for double area sound tracks. Designed for supply from A. C. mains.	33H-2	1Y 50-A	12Y-3	K11CY-4	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M

K311V-6	Special set of optics and spare parts allows change-over to double area sound tracks in studio. Power supply from storage batteries.	33H-1/15	1Y 50-A	12Y-3	K11CY-2	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-7	Special set of optics and spare parts allows change-over to double area sound tracks in studio. Power supply from A. C. mains.	33H-1/15	1Y 50-A	12Y-3	K11CY-4	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-8	Similar to K311V-6 with power supply frequency being 60 cycles	33H-1/15	1Y 50-A	12Y-3	K11CY-4	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M
K311V-9	Similar to K311V-7 with power supply from A. C. mains being 60 cycles	33H-1/15	1Y 50-A	12Y-3	K11CY-3	1Y-101	25 A-1	8 A-5	Y11AΦ-42 M



8 A-5 Dynamic Microphone, with an 11-A-8 type tripod, is used with the public address amplifier when instructions are being relayed. The solid design of the 8 A-5 dynamic microphone ensures reliable performance in expeditionary conditions.

Two УНАФ-42М Communication Telephones, which serve for communications between the sound-recording operator and the sound-recording room.

Any requirements liable to arise with the use of the K3ИY Sound Recorder in expeditions have been taken into consideration in the design of the units.



Fig. 20. 25A-1 Loudspeaker

Switching and inter-connecting of separate parts of the recorder are achieved by means of connector cables with connection plugs. Cable extension is provided to allow the preamplifier, the motion picture camera and parts of the public address channel to be moved to distances up to 100 metres from the remaining equipment (usually installed on a truck).

For railroad transportation and storage of spare parts and service tools the amplifying section of the recorder is provided with three sturdy cases.

Weight of set, complete with carrying cases — approx. 1,050 kg.



K3YC STATIONARY SOUND FILM RECORDER

The K3YC Stationary Sound Film Recorder performs synchronous sound recording on 35-mm film by the photographic method in studios.

In order to meet requirements of recording sound tracks of normal, as well as double area, and connection of the device to different supply lines under varying local studio conditions, several models of stationary sound film recorders are available.

The table below gives brief characteristics of available sound recorder models and their sets.

The K3YC Sound Recorder includes the following units:

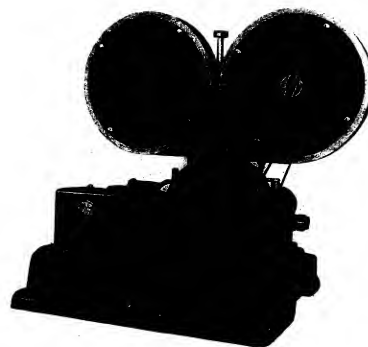


Fig. 21. 3K Recording Device

3K Recording Device (Fig. 21), which records sound tracks on 35-mm film by the variable area method. Recording is of the normal or push-pull noiseless method with standard or double area sound track.

The speed stabilizer (magnetic drive) used with the device ensures unfailing uniformity of film speed past the exposure slit. The light modulation system of the recording device allows for recording with ultra-violet and white light.

Reliability of construction and the high-precision workmanship of its parts provide lasting service, the device being readied for operation by simple insertion of magazines and threading of film. Correct setting of exposure lamp and magnetic drive exciter coil is achieved by means of rheostats, which ensure smooth adjustment controlled by adequate instruments.

Overall dimensions of recording device (height \times length \times width) 640 \times 560 \times 550 mm
Weight of recording device 102.3 kg

12 V-5, type 2 Preamplifier (Fig. 22), which mixes and pre-amplifies incoming signals from the microphones, and allows simultaneous connection of four microphones. The amplifying range permits use of microphones of any type, even under most unfavourable conditions.

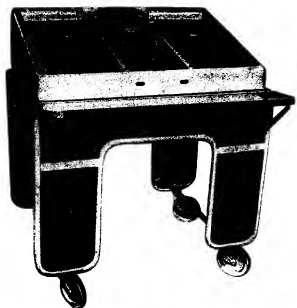


Fig. 22. 12V-5, type 2 Preamplifier

The adjustment range of the frequency characteristics in both preamplifier and main amplifier makes provisions for the requirements of recording in studios.

The electro-mechanical properties of the level indicator mounted in the preamplifier enable full visual control of the volume of signals recorded.

The extremely low level of interferences throughout the amplifying channel is achieved by the electric characteristics of the amplifier input transformers and the type of shields used with them, thus limiting the dynamic range of the recording only by the quality of the film used.

The preamplifier is styled as a panel supported by a movable table equipped with swivel rollers. The device is ready for operation after simple connection to the switchboard by means of connecting cables.

Overall dimensions of preamplifier (height \times length \times width) 1,010 \times 890 \times 600 mm
Weight of preamplifier 92.2 kg

12 V-4, type 2 Main Amplifier (Fig. 23), which is intended for subsequent amplifying of signals from the preamplifier, and for compressing and limiting the output volume. The main amplifier includes a monitor amplifier channel and a loudspeaker, which enable perfect monitoring of the recording.

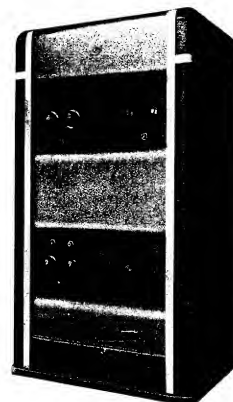


Fig. 23. 12V-4, type 2 Main Amplifier

Control of the main amplifier circuit current is provided by a highly-sensitive instrument with push-button change-over control.

The main amplifier is styled as a metal cabinet accommodating the chassis of both recorder and intermediate amplifiers; the front panel of the cabinet is easily removable to give access to the tubes. Free access to the amplifier parts is provided by the hinged chassis and special rods, allowing to swing the chassis off.

Overall dimensions of the amplifier (height \times length \times width) 912 \times 525 \times 365 mm
Weight of amplifier 50 kg

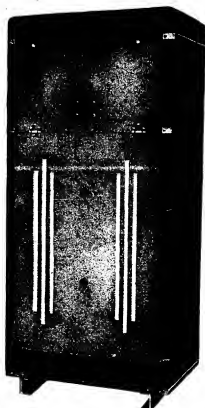


Fig. 24. 12M-3 Power-supply Device

12M-3 Power-supply Device (Fig. 24), which supplies all high and low voltage D. C. circuits with stabilized rectified current. Power is fed to the device from standard 127/220 V, 50-cycle A. C. mains.

The power-supply device ensures the unfailing stabilization of rectified current in a wide range of line voltage variations.

The rectifiers and stabilizers of the power-supply device are mounted in a single cabinet.

Overall dimensions of the power-supply device (height \times length \times width) . . . 1,240 \times 640 \times 400 mm
Weight of device 151 kg

7 K-7 Switchboard Panel (Fig. 25), which serves the power-supply device. The switchboard panel is installed in the recording-room and provides for remote switching of the power-supply device and control of its operations.

Overall dimensions of panel (height \times length \times width)
490 \times 550 \times 550 mm
Weight of panel 22.6 kg

Switching Equipment, which consists of the 6 K-50 main switching unit (Fig. 26), two 6 K-18 studio panels (Fig. 27 and 28), a set of connecting cables and designed for centralized switching of preamplifier and recorder.



Fig. 25. 7K-7 Switchboard Panel

Overall dimensions of the 6K-50 main switching unit (height \times length \times width) 643 \times 563 \times 123 mm
Weight of main switching unit 20 kg
Dimensions of the 6K-18 panel 90 \times 462 \times 103 mm each
Weight of each panel 2.3 kg

Communication System, which is designed for telephone communications between studio and central recording-room.

25 A-7 Monitor Loudspeaker (Fig. 29), which serves for monitoring recording being made in central recording-room.

Overall dimensions of loudspeaker (height \times length \times width) 600 \times 700 \times 300 mm
Weight of loudspeaker 9.3 kg



Fig. 26. Switching Unit

25 A-6 Monitor Loudspeaker (Fig. 30), which enables high-standard audio checking in a special demonstration room thanks to the electroacoustical properties of the speaker.



Fig. 27. 6K-18 Switching Panel



Fig. 28. 6K-18 Switching Panel

Overall dimensions of loudspeaker (height \times length \times width) 860 \times 720 \times 430 mm
Weight of loudspeaker 41 kg



TABLE
of K3YC Sound Film Recorder Sets

Symbol	Model	Main Units of the Set					
		Recording device	Preamplifier	Main amplifier	Power supply device	Switching equipment	Communication system
K3YC-5	Basic model	3K-4	12 Y-5, model 2	12 Y-4, model 2	12 M-3, model 2 with 7 K-7, model 2 switchboard	6 K-50 with two 6 K-18 panels	Available
K3YC-6	Recording device with optical system for double area sound track recording	3K-5	12 Y-5, model 2	12 Y-4, model 2	12 M-3, model 2 with 7 K-7, model 2 switchboard	6 K-50 with two 6 K-18 panels	Available
K3YC-7	Recording device has set of optics and spare parts, which allow change-over to double area sound tracks for audio work	3K-4	12 Y-5, model 2	12 Y-4, model 2	12 M-3, model 2 with 7 K-7, model 2 switchboard	6 K-50 with two 6 K-18 panels	Available
K3YC-8	Similar to K3YC-5, but supplied with power from 60-cycle frequency mains	3K-6	12 Y-5, model 2	12 Y-4, model 2	20 B-6 with 50 K-2 switchboard	6 K-50 with two 6 K-18 panels	Available
K3YC-9	Similar to K3YC-7, but supplied with power from 60-cycle frequency mains	3K-6	12 Y-5, model 2	12 Y-4, model 2	20 B-6 with 50 K-2 switchboard	6 K-50 with two 6 K-18 panels	Available

The main wiring of the recorder is of the stationary type. Detachable wiring consists of flexible cables provided with special connectors to ensure dependable connections.



Fig. 29. 25A-7 Monitor Loudspeaker

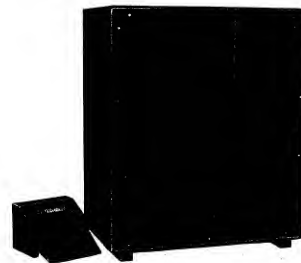


Fig. 30. 25A-6 Monitor Loudspeaker

Weight of the complete sound recorder set packed in carrying cases is about 1,100 kg.

KI13-1 FILM RE-RECORDING EQUIPMENT

The KI13-1 Re-recording Equipment is adapted for sound re-recording on 35-mm film from photographic sound tracks and magnetic tapes as well as for sound recording of announcer's speech.

The equipment provides for simultaneous high-standard sound re-recording from eight sound tracks recorded on 35-mm film.

The equipment provides a wide range of independent volume control and adjustment of signal frequency characteristics of the re-recorded sound from 50 to 8,000 cycles.

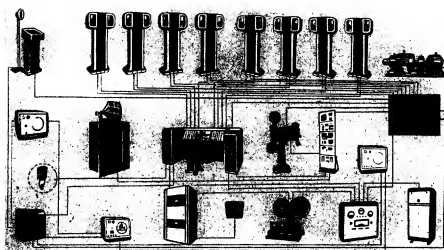


Fig. 31. General Scheme of KI13-1 Re-recording Equipment

The interlock drive system of the equipment ensures travelling of the film through the sound reproducing device and projector at a speed of 24 picture frames per sec with power frequency of 50 cycles.

The complete set includes the following units (Fig. 31):
Eight sound reproducing devices.
Re-recording control panel.
Interlock drive system.

Loudspeaker communication and command system.
Recorder device.
Sound reproducing unit and accessories.
Projector.

4 P-1 Sound Reproducing Device (Fig. 32) of the KI13-1 re-recording equipment has a new design: besides the film-transporting mechanism with an optical scanning system it is provided with a photoelectronic multiplier and a stabilized power supply source for exposure lamp and amplifier.

The mechanism is power-driven by the 5 M-1 motor of the interlock system.

A smooth-surface drum of reduced diameter provides for a high degree of stabilization of film-travelling speed.

High-standard performance of the device and the possibility for sound reproducing from any kind of sound track are achieved by the system of optical scanning.

The device provides passage for film loops with a diameter from 2 to 15 metres.

Swift rewinding of 300-metre film roll in 1.5 minutes is an important service feature.

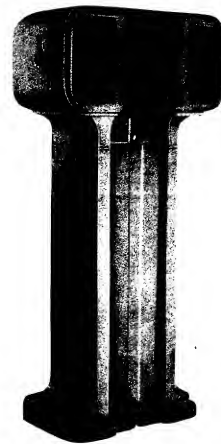


Fig. 32. 4P-1 Sound Reproducing Device

70 K-1 Re-recorder Control Panel (Fig. 33) centralizes the main units controlling re-recording operations, such as: adjustment of volume and frequency characteristics of 8 channels; switching of input circuits and their supplementary adjusters, amplifier adjusting devices and limiting filters, signal and loudspeaker communication system, etc.

Ease in transportation is a special feature of the panel design: it may be dismantled into three separate parts and easily assembled again on arrival.

Easy access is provided for inspection and repairs of panel parts. Highly identical channel characteristics and reduced response of adjuster link coils to exterior magnetic fields is achieved by the use of asyfferous rings in the design of filters and coils.



The channel layout is of the two-way system using mixing transformers, and achieves high values of transitory channel fading.



Fig. 33. 70K-1 Re-recorder Control Panel

Interlock Electric Drive of sound-reproducing devices and the projector is effected by the 4M-4 generator-governor (Fig. 34) driven by a synchronous motor and provides a film-travelling speed of 24 pict. frame per sec, with a 50-cycle frequency of the power supply mains.

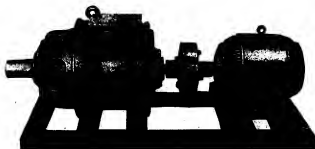


Fig. 34. 4M-4 Generator-Governor



Fig. 35. 7K-9 Main Terminal Board



Fig. 36. 80K-1 Control Desk

The drive is fed from the 7K-9 main terminal board (Fig. 35). Remote control of the drive is achieved by means of the 80K-1 control desk (Fig. 36) installed in the reproducer booth. Synchronous stoppage of the system may be effected from the re-recorder control panel and the signal panel in the re-recorder booth.

Loudspeaker Communication and Signal System consists of self-contained 11K-3 communication panels (Fig. 37) situated in adequate operation spots, and various units of communication and signals of the control panels 11K-2 (Fig. 38).



Fig. 37.
11K-3 Communication Panels

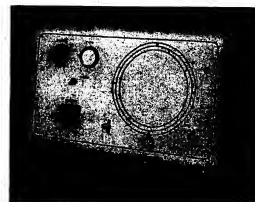


Fig. 38.
11K-2 Control Panels

The signal system is intended to relay general and local signals in accordance with studio routine.

The loudspeaker communication system maintains communications between the main channel control panel and corresponding operation locations, as well as direct two-way communications between any of these locations.

Recorder Device used with the KII3-1 re-recording equipment represents a modified set of the K3VC sound recorder serial. It consists of the following units:

- 3K-4 Sound recording apparatus (Fig. 39).
- 100Y-2 Main amplifier (Fig. 40).
- 12M-3 Power-supply device (Fig. 41).
- 6K-50 Switching unit (Fig. 42).
- 30A-3 Two-band speaker (Fig. 43).
- 7K-7 Control panel (Fig. 44).

The 7K-7 Control panel for 12M-3 power-supply unit is somewhat modified to meet requirements of supplying the equipment directly from the supply mains or through the main terminal board.

Sound Reproducing Unit and Accessories used with the KII3-1 re-recording equipment are of the KVCY-52 sound reproducing equipment type, detailed features of which are given in the catalogue.

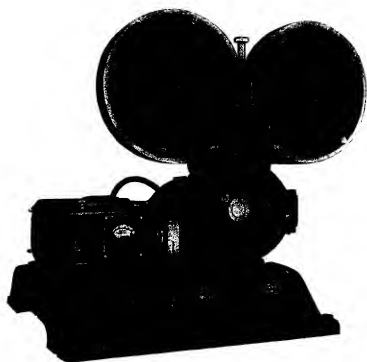


Fig. 39. 3K-4 Sound Recording Apparatus

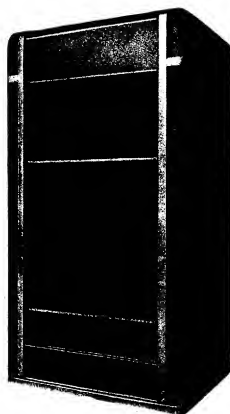


Fig. 40. 100Y-2 Main Amplifier

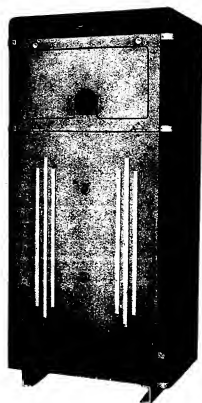


Fig. 41. 12M-3 Power-supply Device

The KIIT-1 Stationary Projector has been somewhat modified for use with the KII3-1 re-recording equipment, the asynchronous electric projector motor being substituted by a 5M-2 self-synchronizing electric motor with a special reduction gear providing



Fig. 42. 6K-50 Switching Unit

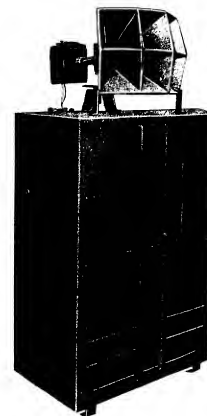


Fig. 43. 30A-3 Two-band Speaker

precise conformity of the film-travelling speed within the projector and reproducing device. The projector is equipped with an automatic shutter which cuts the light beam when operation ceases.



Fig. 44. 7K-7 Control Panel

For the convenience of small studio outfits a somewhat modified set of re-recording equipment KИ3-2 is made available for simultaneous re-recording from four sound reproducing devices.

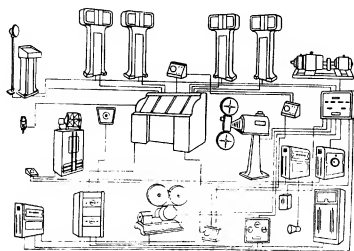
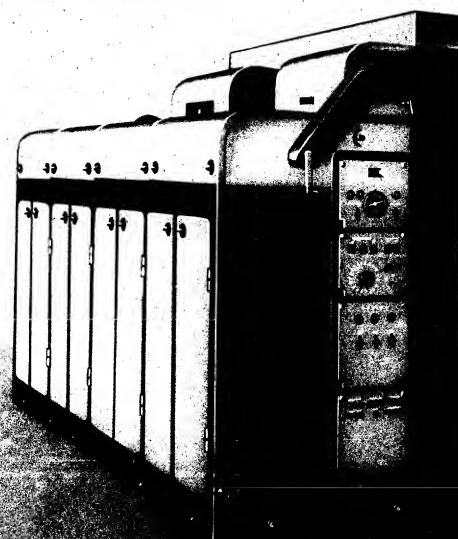


Fig. 45. General Scheme of KИ3-2 Re-recording Equipment

The design of the KИ3-2 equipment is similar to that of the KИ3-1, but it has only four 4P-1 sound reproducing devices and a 70K-2 re-recorder panel.

A general scheme of KИ3-2 equipment is shown in figure 45. Three-phase A.C. 220 V, 50-cycle mains provide the power supply.

Power consumption is approx. 10 kW.



LABORATORY EQUIPMENT



40II-1 AUTOMATIC DEVELOPING MACHINE

The 40II-1 Automatic Developing Machine (Fig. 46) performs photo-chemical processing of negative and positive 35-mm black-and-white film.

The film-threading mechanism of the machine is covered with a light-proof metal hood, allowing film processing in a lighted room.

The machine consists of two self-contained developing systems for both positive and negative films with a multi-loop arrangement of the films.

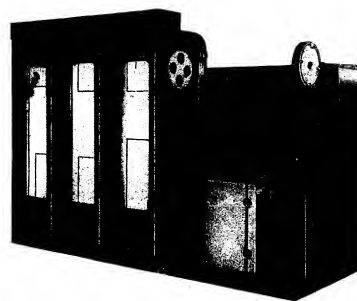


Fig. 46. 40II-1 Automatic Developing Machine, view from side of drier cabinet

The frame of the Developing Machine is conveniently furnished with four rollers, allowing easy moving of the equipment.

Mechanical damage to film perforations during the processing is eliminated by the use of frictional methods of film transportation.

The Developing Machine is provided with an interlocking device for:

- a) automatically shutting off the machine drive when film breakage occurs in the wet part of the film path, and when the lower rollers of the threading magazine reach their extreme upper position;

b) sounding of warning signal when the feed reel is empty.
A constant temperature of the developing solution at $20 \pm 0.3^\circ \text{C}$ is automatically maintained by an air-conditioning device (heater and cooling device).

Uniform conditions of film drying are ensured by the smooth adjustment of heating temperatures and incoming air.

The Automatic Developing Machine consists of the following parts:

- Framework on which all assemblies and units are mounted;
- Tanks;
- Wet part of the film-threading path, including film transportation mechanism;
- Drier cabinet with transportation and winder mechanisms;

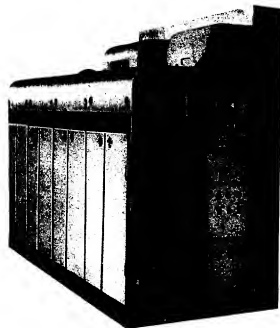


Fig. 47. Developing Machine Control Panel

Air-conditioning system, consisting of: a) filter, b) blower fan with electric motor, c) baffle for controlling air blast entering the drier cabinet, d) air duct to squeegee, e) electric air-heating apparatus;

Plumbing system, consisting of: a) water conduit to washing tanks and thermostat, b) sewer line for drainage from all tanks, c) hypo line for pumping hypo from the second tank to the first one by means of electrically-driven pump, d) hypo recovery line from first tank of final washing, e) two independent developer lines (negative and positive) with pumps providing circulation of developing solution and thermostat for maintaining constant temperature, f) supply lines of developer systems with replenishment from metering tanks;

Driving mechanism which is an electric motor with variable speed reduction gear;

Control panel on which are mounted all instruments of control (Fig. 47);

Hoods for the replenisher metering tank, machine driving mechanism and solution conduits;
Light-proof magazines.

SPECIFICATIONS

Output of the Automatic Developing Machine varies from 50 to 300 metres per hour, the developing time varying accordingly from 16 to 2.5 min.

Power supply from three-phase 220 V, A. C. mains.

Power consumption — 11 kW.

Time of film processing stages, in minutes:

Processing Stage	For Positive Film		For Negative Film
	Basic processing speed of 200 metres per hour	Increased processing speed 300 metres per hour	
Developing	4	2.7	16
Intermediate rinsing	1.4	0.9	5.6
Fixing	4	2.7	16
Final washing	6.1	4	24.4
Drying	20	13.3	80
Total time	35.5	23.6	142

Overall dimensions of Automatic Developing Machine $2,900 \times 1,965 \times 1,100$ mm

Weight of machine: 1,000 kg
without solutions 2,060 kg

KII3-2 FILM SAMPLE PRINTER

The Sample Printer (Fig. 48) prints samples from 35-mm negatives on positive film, facilitating correct selection of the exposure and light number for release printing of motion picture films by continuous printing.

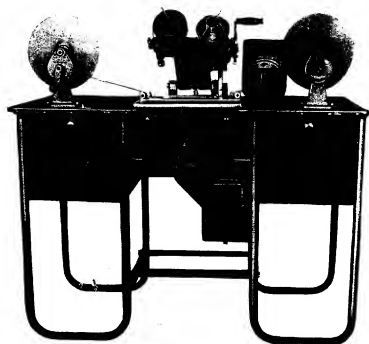


Fig. 48. KII3-2 Film Sample Printer

The Sample Printer provides for simultaneous printing of negative lengths of ten picture frames each (Fig. 49 and 50), showing uniform photographic density with ten different illumination intensities corresponding to those of the continuous printer; printing is achieved by contact method. This facilitates the selection of convenient exposure conditions for the printing of each negative film length by visual inspection of the positive sample and comparison of the ten images of different exposure.

Illumination of the printing gate is provided by a single light source. Interposition in the light path of the film-channel gate of

neutral-grey light filters allows for the establishment of different illumination stages.

The exposure time is adjusted by modifying the shutter slit dimensions.



Fig. 49. KII3-2 Printer Head

The head is lowered by hand. Rewinding of positive film, shutter operations, and lifting of head are effected automatically by pressing a lever.

The Printer is equipped with adequate instruments providing for control of operating conditions and adjustment of printer lamp.



Fig. 50. KII3-2 Printer Head, rear view

SPECIFICATIONS

Capacity of film magazines:
 for positive film 60 metres
 for negative film 300 metres
 Illuminating system fed with 110—120 V D. C.
 Printer lamp 300 W, 110 V
 Maximum exposure time 0.05 sec
 Overall dimensions of printer (length
 × width × height) 1,360×660×1,230 mm
 Weight of printer 150 kg

YKA SOUND FILM PRINTERS

Available are three serial models of the YKA Sound Film Printer:

YKA-M — for mass release printing on 35-mm film from density-corrected duplicated negatives of black-and-white motion picture films.

YKA-II — for mass release printing on positive 35-mm multilayer colour film.

YKA-T — for routine printing on 35-mm film of colour and black-and-white motion pictures.

Model YKA-M

The YKA-M Printer (Fig. 51) is for mass release printing on 35-mm film of black-and-white motion pictures in motion-picture printing laboratories.

The machine prints from density-corrected duplicated negatives, each portion film roll being printed under constant illumination of the printer film gate. Changes of image printing illumination are achieved by diaphragms with different apertures, which are inserted into a special recess in the light beam path.

The YKA-M Printer is the basic model for all other printers.

Model YKA-II

The YKA-II Printer (Fig. 52) is for mass printing on 35-mm multilayer film of colour sound films in motion-picture printing laboratories.

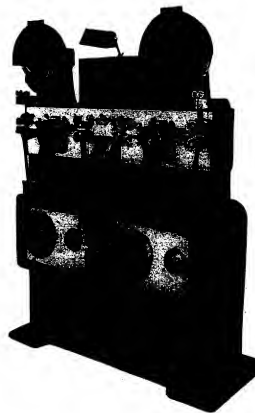


Fig. 51. YKA-M Printer

The machine prints from multi-layer colour negatives or duplicated negatives. Change of image printing illumination is produced by the AP automatic device, which shifts a light control band with punched openings and light-filters. Fore filter holders mounted in special recesses in the path of the light beam are provided.

Model YKA-T

The YKA-T Printer (Fig. 52) is for regular printing on 35-mm film of black-and-white sound films in motion-picture printing laboratories.

Printing is done from negatives. Change of image printing illumination is achieved by the AP automatic device which shifts a light control band with punched openings. The machine may be adapted for regular printing of colour films if a control band similar to that of the YKA-II model and fore filters are fitted to it.

Fig. 52. YKA-II and YKA-T Printer

Reverse drive allows printing without rethreading the negatives.

All the models of the YKA Printer are designed on basically similar lines, which facilitates repairs and maintenance.

Spare lamps and necessary tools are supplied with the YKA Printers. On special order the YKA Printers may be provided with the following accessories:

- a) Jack-bogie for transportation (Fig. 53).



Fig. 53. Jack-bogie for transportation of YKA Printers

- b) ПИМД-3 Light Control Band Puncher (Fig. 54) for punching circular apertures on a 35-mm perforated paper band when making light control bands for YKA-II and YKA-T Printers.

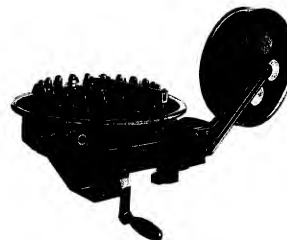


Fig. 54. ПИМД-3 Light Control Band Puncher

The Puncher has 20 circular punches of various diameters from 6.2 to 22 mm; the punching is done by hand.

- c) The MBII-3 Slot Cutting Machine (Fig. 55) for cutting lateral slots in negative films to achieve switchover impulses of the light control band in YKA-II and YKA-T Printers.

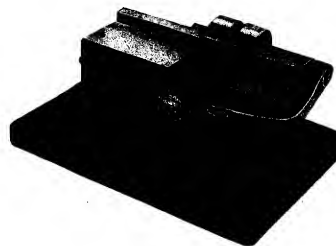


Fig. 55. MBII-3 Slot Cutting Machine

- d) The ПИМД-1 machine for stapling of light control bands used with YKA-II Printers, the stapling being done by means of metal staples.

SPECIFICATIONS

(common to all YKA models)

Path of film travel continuous in one plane
Direction of film travel reversible
Speed of film travel up to 1,640 metres per hour



Printing method by contact, over sprockets with
bilateral compressed air contacting
arrangement

Capacity of film magazine 300 metres

Printing lamp 300 W incandescent lamp

Power supply of printing lamps from 100 V D. C. line

Adjustment of power supply to
printing lamp by means of rheostats

Control of power supply to printing
lamp by means of measuring instruments
on control board

Adjustment of sound track printing
gate illumination by means of diaphragms

Electric drive 1,440 r.p.m., 220 V, 50 cycles asyn-
chronous, three-phase electric motor

Control of electric drive by means of reversible electro-
magnetic starter

Local illumination by means of a 220/24 V transformer

Interlocking devices work when:

- a) printing lamps burn out,
- b) spool ends,
- c) pressing clamp of the printing
assembly is not secured,
- d) negative film (in VKA-M model)
tears.

Film cleaning by filtered air provided by the
ventilation system

Overall dimensions of printer (length
× width × height) 1,320×560×1,660 mm

Weight of Printer (in carrying cases) 1,000 kg

MM-11 FILM RENOVATION MACHINE

The MM-11 Film Renovation Machine (Fig. 56 and 57) eliminates mechanical damage from the film base, and plastifies it.

Elimination of damage is achieved by the method of superficial dissolving of the film base by highly-volatile solvents, followed by rolling of the base over a glass disk with a matte or glossy surface.



Fig. 56. MM-11 Film Renovation Machine

The essential parts of the machine are: frame, electric drive, winding device for 600 metres of film, cleansing device, post-cleansing drying chamber, pressure rollers, renovation assembly, take-off rollers, post-renovation drying chamber, winding device, mechanism for lifting and lowering of the solvent bath, solvent tank, solvent vapour-exhausting system, control panel.

The cleansing device effects damp cleansing of the film base and dry cleansing of the emulsion side.

Design of the pressure rollers ensures adjustment of the film pressure against the glass disk.
Solvents are fed automatically.



Fig. 57. MM-11 Film Renovation Machine, rear view

Quick lifting and lowering of the bath is achieved by a special mechanism, which also adjusts the humidifying rate of the glass disk and of the solvent level in the bath.

SPECIFICATIONS

Speed of film travel	250 and 500 metres per hour
Machine drive	0.52 kW explosion-proof asynchronous electric motor
Film-threading chambers	airtight
Overall dimensions of machine	1,320×1,590×550 mm
Weight of machine	400 kg

PVII-1 CUTTING MACHINE

The PVII-1 Cutting Machine (Fig. 58) cuts 32-mm film into two 16-mm film strips.

Machine drive is provided by an asynchronous electric motor with reduction gear.

The cutting mechanism consists of two knives fitted on parallel shafts and rotating in opposite directions.

The special design of the knives achieves high-precision film-cutting.

The upper and lower disk-shaped knives are protected by hoods for operation safety and prevention of winding of cut film around the knives.

A 165° portion of the lower knife circumference is encircled by the film held down by pressure roller.

Film transportation within machine is performed by the lower knife and two take-up devices.

The film-feed device is installed in the lower part of the machine, consisting of an open spool fastened on a freely-rotating spindle with an adjustable brake. The spool is designed for use with a standard 50-mm core or with a special 100 mm-diameter core.

Over the feeding device is fitted a guide roller which directs the film to a 20-tooth sprocket. The sprocket and the two upper take-up devices ensure the necessary film tension around the lower knife.



Fig. 58. PVII-1 Cutting Machine

The upper 20-tooth sprocket is intended to align tensioning on the take-up device of both film strips (after cutting) in order to prevent disalignment of the film on the knife.

The moving parts of the machine are mounted on ball bearings.

SPECIFICATIONS

Speed of film transportation 28.9 metres per min or 1,730 metres per hour
Maximum length of roll to be cut . . 600 metres
Diameter of core:
 with 120-metre reel 50 mm
 with 600-metre reel 100 mm
Width of strip being cut 15.95 \pm 0.05 mm
Power supply from three-phase, 127/220 V, 50-cycle mains
Electric motor drive 0.25 kW, 1,500 r.p.m.
Overall dimensions of the machine 1,635 \times 570 \times 855 mm
Weight of machine (in carrying cases) 320 kg



KCII-3 FILM STAPLER

The KCII-3 Stapler (Fig. 59) is designed for mechanical splicing of 35 mm motion-picture film ends.

Wire staples are used for the splicing. They are loaded into the stapler in 100-piece packages.



Fig. 59. KCII-3 Film Stapler

Pressing of the Stapler handles automatically releases one staple to fasten the film ends.

The Stapler is hand-operated and extremely easy to handle.

Overall dimensions of the Stapler . . 32 \times 85 \times 160 mm
Weight of Stapler 400 g
The staples are of 11 \times 6 mm size

35-3MA-3 SOUND EDITOR

The 35-3MA-3 Sound Editor (Fig. 60) is designed for sound editing of 35-mm film and performs the following processes:

Synchronization of basic sound track, music and noises with image.

Synchronization of sound track and sound film during doubling and editing.

Synchronous visual and audible control of film from separate "picture record" and "sound record" films.

Visual and audible control of the edited film or parts of it.

The essential process of sound editing — synchronization of "picture record" and "sound record" films is achieved in two stages:

a) The "picture record" film is shifted by means of an electrical drive in forward or reverse direction at a speed of 5—30 picture frames per sec, while the "sound record" film is stationary.

b) Shifting of the "sound record" film relatively to the "picture record" film is accomplished by hand through a differential mechanism in the process of a simultaneous running of both films. This provides great convenience in editing sound films.

The Editor is adapted for simultaneous visual and audible control of image and sound track printed on one film. This makes the Editor desirable for foreign-language doubling.

The design of both Editor viewing and sound heads provides for easy threading of the film, and allows winding of film on spools or special hubs, as well as a free travel of the film from the device. Provision is made for editing of film lengths of 3—4 picture frames.

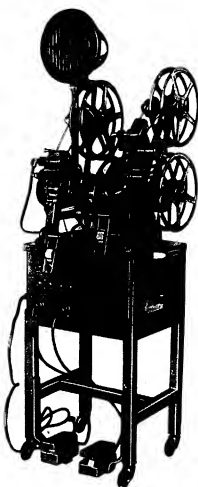


Fig. 60. 35-3MA-3 Sound Editor

Starting, stopping and reversal of sound-head and projector-head electric motors, adjustment of motor speed, switching of amplifier of sound and projector lamps are achieved by means of switches and rheostats conveniently located for operation.

The Editor's projector system does not require a darkened room.

The Editor's mechanism, its electric drive, amplifier and loudspeaker are mounted on a metal table equipped with four swivel wheels on rubber tires.

Light weight, small overall dimensions and ease in dismantling make the device convenient for use in studios and laboratories, and in outdoor conditions.

SPECIFICATIONS

Power supply from 110 V, 50 cycle A.C. mains
Power consumption 600 W

Projector (viewing) head. Film propelling is achieved by means of a maltese cross mechanism with a 16-tooth transporting sprocket. Precision workmanship of the mechanism parts ensures a noiseless performance.

The image is viewed through a picture-frame gate by means of a magnifier mounted in the gate of the film channel.

The image is magnified to 3 times its size.

Projection lamp — 15 W, 110 V with E-14 socket.

Power drive — 65 W, 110 V, 6,000 r.p.m. commutator motor.

The design of the picture-frame gate provides for easy setting of synchronous control marks on the film.

Sound head. Uniform propelling of the film is achieved by a 16-tooth sprocket.

Differential gearing allows quick and slow propelling of the "sound record" film. The head also permits use of 17.5-mm films with unilateral perforation (halved 35-mm film).

The design of the film channel gate provides for setting of synchronous control marks on the film.

A current of supersonic frequency is supplied to a 3 W, 4 V exciter lamp from a lamp generator.

The photoelectric cell — of type ИГ-3.

Power drive — 50 W, 110 V, 50 cycle, 1,500 r.p.m. asynchronous single-phase condenser-type electric motor.

Film-winding device. Projector and sound heads are provided with reversible winding devices and dismountable reels of 300-metre film capacity. For small film rolls (up to 80 metres) the device has special hubs mounted on swiveling brackets.

Amplifier and loudspeaker. The 1V-7 Amplifier is installed in the metal box of the projector table.

Nominal output volume of the sound frequency is 2.5 W, the non-linear distortion factor not exceeding 3% at 1000-cycle frequency and 5% at 100-cycle frequency.

The band of reproduced frequency ranges from 50 to 8,000 cycles.

The amplifier power-supply voltage is 110 V, 50 cycles.

Electronic tubes used with the amplifier are: 6XK7 (2 pcs.), 6П3 or 6JL6, 50186, 5И4c.

The 4-A-18 loudspeaker is fitted on a special bracket above the sound head.

Various accessories and spare parts are supplied with the Editor.

Overall dimensions of the Editor . . . 500×600×1,600 mm

Weight of Editor 100 kg

35-MMHC-3 SUBTITLE MAKING MACHINE

The Subtitle Making Machine prints subtitles on 35-mm film by the mechanical method with use of clichés.

Main advantages of the mechanical method of subtitle printing are: printing on ready-made films and simplicity of technical process allowing printing of subtitles at film-exchange offices.

The complete set includes:

35-MMHC-3 Subtitle Making Machine for Mechanical Printing (Fig. 61), which consists of the following units: assembly for

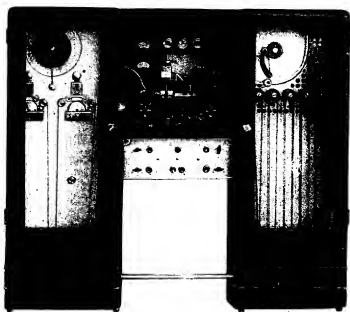


Fig. 61. 35-MMHC-3 Subtitle Making Machine for Mechanical Printing

dampening of the film-emulsion layer by special solvents; assembly for printing subtitles on softened film-emulsion layer by means of heated matrix-clichés; film drying assembly (after printing of subtitles) working on warm air from heating devices and fan; control panel for all elements of operation.

The subtitle printing assembly has a printing mechanism, a light-control band head and a projector device intended for checking quality of printed subtitles.

The design of the machine allows operation of the printing machine by hand, semi-automatically, or automatically.

Subtitle-printing speed ranges from 2 to 15 picture frames per sec.

Length of film rolls to be subtitled . . . 300 metres
Projection lamp 21 W, 12-16 V
Pilot lamp 8 W, 110 V

35-CHIC-1 Bench for Synchronized Printing (Fig. 62), which produces control bands for automatic subtitle printing on 35-mm film with the 35-MMHC-3 machine.



Fig. 62. 35-CHIC-1 Bench for Synchronized Printing

The bench consists of the following units: synchronizer, control band puncher, and rewinding device

Rewinder reel capacity 300 metres
Rotation of synchronizer achieved by film tensioning
Film travelling in horizontal plane.

MPK-2 Cliché Cutting Machine (Fig. 63), which is a milling machine designed to cut ready 120×160-mm cliché plates into separate 8×22-mm matrixes.



Fig. 63. MPK-2 Cliché Cutting Machine

SPECIFICATIONS

Power supply 220/380 V, 50 cycle, A. C. mains
 35-MMIC-3 machine total power
 consumption 2.7 kW
 Overall dimensions:
 35-MMIC-3 machine 1,490×1,670×510 mm
 35-CIC-1 machine 1,300×1,250×600 mm
 MPK-2 machine 970×670×630 mm
 Total weight of 35-MMIC-3 sub-
 title making machine approx. 650 kg



35-CIA-2 SEMI-AUTOMATIC FILM SPLICING MACHINE

The 35-CIA-2 Semi-Automatic Film Splicing Machine (Fig. 64) is designed for splicing 35-mm standard perforated or unperforated film. The Semi-Automatic Splicing Machine performs shearing, scraping, splicing, and pressing of spliced film ends.

The machine is for use in film-manufacturing factories, film-printing laboratories and film-exchange offices.

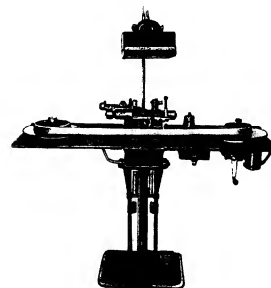


Fig. 64. 35-CIA-2 Semi-Automatic Film Splicing Machine

The Semi-Automatic Splicing Machine offers speed, ease and high efficiency in the film-splicing process.

Speedy drying of the splices is ensured by a heating device. The machine has illuminators under the path of the film and above the splicing machine head.

Replaceable ground-glasses (white) and a set of nonactinic red light-filters are provided with the illuminating devices.

SPECIFICATIONS

Power supply from 110 V A.C. mains
 Straight splice, width of splice . . . 3 mm
 Film rewinding by hand or electric drive
 Geared rewind reel 1:3 ratio, acceleration type
 Commutator motor 110 V, 25 W, 3,600 r.p.m., sealed type
 Change of motor speed by pedal-operated rheostat
 Travel of motion picture in horizontal plane
 Power consumption approx. 150 W
 Height (from floor) of bench surface 780 mm
 Overall dimensions of Splicer 697 × 1,000 × 1,285 mm
 Weight of Splicer 95 kg

35-CO-1 SYNCHRONIZER

The Synchronizer (Fig. 65) is intended for synchronous alignment of two and three 35-mm motion picture films with sound and picture records during studio film-editing.

The synchronizer is a portable apparatus conveniently fitted on the Editor table without fastenings. If permanent installation is required special holes are provided to secure it to table with screws.



Fig. 65. 35-CO-1 Synchronizer

The Synchronizer's mechanism arranges the film rolls horizontally, and consists of a freely rotating 64-tooth sprocket and pressure rollers. The sprocket stops automatically when the rollers are swung aside.

The sprocket shaft of the Synchronizer is mounted on ball bearings and is easily rotated by the film edited. Easily rotating pressure rollers supported by special carriage effect contact of film and sprocket. A spherical push-button on the top of the sprocket swings aside the pressure rollers to release the films.

Radial etches on the Synchronizer's upper crown provide perfect picture frame adjustment by alignment with interframe film spaces.

The Synchronizer has a cast support.

Performance reliability is a characteristic feature of the Synchronizer.

Overall dimensions of the
 Synchronizer 180 × 145 × 85 mm
 Weight of Synchronizer 3 kg



16-ИСП 16-mm FILM SPLICER

The portable, easy-to-handle 16-ИСП Film Splicer (Fig. 66) of the bench type is intended for splicing of 16-mm positive and negative film in film manufacturing factories, film printing laboratories, studios, film-exchange offices and motion picture theatres.

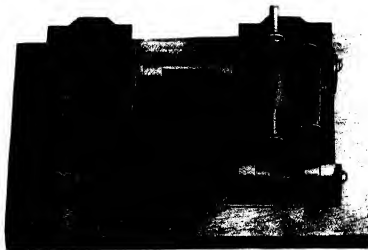


Fig. 66. 16-ИСП Film Splicer

A special device in the Splicer shears off damaged film ends when the film is fitted into the Splicer. Another special device scrapes emulsion off the film ends.

Quick replacement of the blades is facilitated by their construction. The design of the Splicer ensures standard and high-quality splicing.

Overall dimensions of Film Splicer 150 X 90 X 51 mm
Weight of Film Splicer 900 g

35-ИСП-3 35 mm FILM SPLICER

The 35-ИСП-3 Film Splicer (Fig. 67) is designed for splicing 35-mm positive and negative films in film manufacturing factories, film printing laboratories, studios, film-exchange offices and motion picture theatres.



Fig. 67. 35-ИСП-3 Film Splicer

The Splicer effects shearing and scraping of the emulsion off the film ends.

The design of the Splicer ensures standard and high-quality splicing.

A bottle of cement is fitted in the Splicer frame.

The blades are easily removed for grinding.

Overall dimensions of Splicer 215 X 130 X 100 mm
Weight of Splicer 4 kg

ΦC-2 FILM INSPECTION BENCH

The ΦC-2 Film Inspection Bench (Fig. 68) is intended for rewinding, visual inspection and current repairs of 16-mm and 35-mm motion picture films.



Fig. 68. ΦC-2 Film Inspection Bench

The Film Inspection Bench consists of the following easily transportable and dismantable parts:

Top board with disks, driving mechanism and drawers.
Lateral bench supports (2 pcs.).
Brace.

Rewinding of 16-mm or 35-mm film rolls is effected by changing the disk cores.

The disks permit accommodation of 600-metre capacity reels of 16-mm film.

The feed and take-up disks are both provided with a breaking device for simultaneous stoppage of the disks.

Rewinding is done by hand.

Easy rotation of the take-up disk is ensured by a gear mechanism.

35-MOF-3 HORIZONTAL FILM REWINDER

The 35-MOF-3 Horizontal Film Rewinder (Fig. 69) is intended for rewinding 35-mm film on editing benches and semi-automatic film splicers.

Design of the Horizontal Rewinder allows easy installation on rewinding benches.

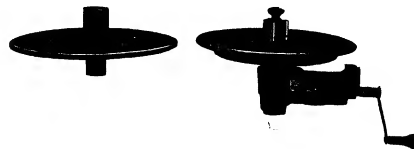


Fig. 69. 35-MOF-3 Horizontal Film Rewinder

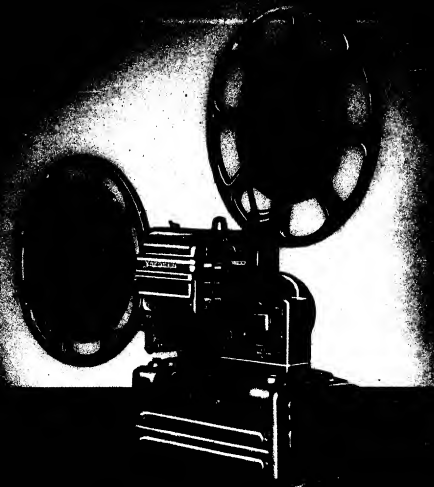
The Rewinder ensures close and uniform rewinding and eliminates film breakage and scratching during the winding process.

The removable cores are easily fitted on the spindles of the take-up and feed disks (empty or loaded).

Free access is provided to all friction parts for lubrication.

SPECIFICATIONS

Diameter of feed and take-up disks	300 mm
Diameter of cores: for feed disk	48.5 mm
for take-up disk	50 mm
Accelerating ratio of hand-drive gearing	1:3
Overall dimensions of take-up winder with disk	430 × 165 × 210 mm
Overall dimensions of feed winder	120 × 310 mm
Weight of take-up winder with disk	5.6 kg
Weight of feed winder	1.4 kg



**MOTION PICTURE PROJECTORS
AND EQUIPMENT**



**"UKRAINA" 16-mm PORTABLE SOUND-ON-FILM
PROJECTOR**

The Portable Sound-on-Film Projector "Ukraina" (Fig. 70) is adapted for showing 16-mm black-and-white and colour sound films in halls with a seating capacity of 200.

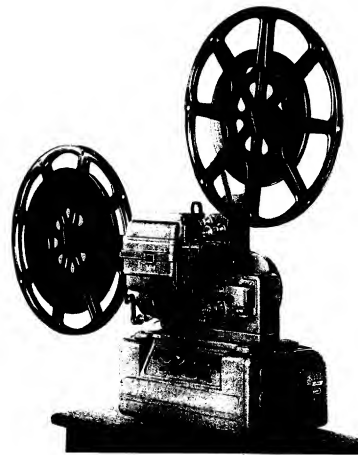


Fig. 70. Sound-on-Film Projector "Ukraina"

Its excellent performance and high technical features make it one of the best modern sound-on-film projectors in their class.

Superb visual and sound projection, powerful light flood, noiseless operation, absolute fire safety, ease in film threading and

convenience in handling, low power consumption, facility in transportation, and a high degree of reliability — these and many more features characterize the unit.

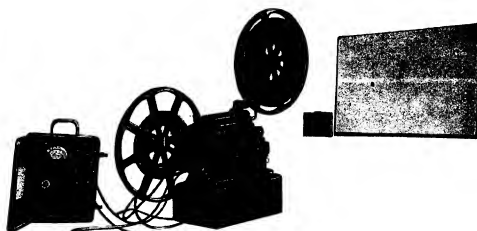


Fig. 71. Set of Sound-on-Film Projector "Ukraina"

Bright illumination of a 5-sq. metre screen is ensured by an efficient light flood of 250 lumens achieved by a lamphouse of special design, lighting optics, high-quality coated lens, and a powerful projection lamp of 400 W.

Use of non-inflammable film allows installation of the Projector directly in the auditorium, eliminating the need for a special projection booth. This is an additional feature which makes the Projector desirable for schools, clubs, village motion picture theatres and home entertainment.

The Sound-on-Film Projector "Ukraina" includes the following units (Fig. 71):

III-16-1 Motion Picture Projector.

KIIV-50 Amplifier (Fig. 72).

KAT-14 Auto-transformer (Fig. 73).

ЭПМ-2 Screen.

III-16-1 Motion Picture Projector. Power supply of Projector from single phase 110 V or 220 V, 50 cycle A. C. mains. Voltage variations in the mains are controlled by an auto-transformer.



Fig. 72. KIIV-50 Amplifier with Loudspeaker

Projector drive — asynchronous single-phase 35 W, 3,000 r.p.m. electric motor.

Film motion achieved by intermittent mechanism at speed of 24 picture frames per sec.

Light source — 400 W, 30 V projection lamp.

Coated anastigmatic projection lens of 1:1.2 relative aperture and 50-mm focal

length, providing brilliant illumination of 2.5-meter-wide screens. Lens with 35 or 65-mm focal length may also be installed in the Projector.

The efficient light flood with working shutter (without film) is approximately 250 lumens at 2,700-stilb brightness of projection lamp.



Fig. 73. KAT-14 Auto-transformer

The 3 W, 4 V exciter lamp is supplied from a selenium rectifier, mounted in the amplifier.

The optical scanning system is cylindrical; light slit dimensions are 1.9×0.018 mm.

Take-up and feed mechanisms ensure standard performance with 120 and 600-metre film reels.

Power consumption — 550 W.

Overall dimensions of projector (packed in carrying case) 255 × 450 × 515 mm
Weight of projector (packed in carrying case) 26 kg

KIIV-50 Amplifier with Loudspeaker. Power supply — single-phase 110 V, 50 cycle A. C. mains.

Power consumption — 100 W.

Rated output volume of sound frequency — 10 W, the nonlinear distortion factor not exceeding 3% on frequencies of 500-1,000 cycles, and not exceeding 6% on boundary frequencies.

The following electronic tubes and auxiliary lamps are used in the unit:

6Ж7, 6Н9М, 6П3 (2 pcs.), 5И4С, МН3 (neon indicator), МН-15 (6.3 V, 0.28A incandescent lamp), ФЭВ-2 (photo-electronic multiplier).

The loudspeaker consists of two heads mounted in a grid-case. The sound coils of both heads are series-connected.

The frequency range of the loudspeaker extends from 100 to 6,000 cycles.

Overall dimensions of Amplifier (packed in carrying case) 295 × 410 × 560 mm
Weight of Amplifier (packed in carrying case) 25 kg
Overall dimensions of loudspeaker (packed in carrying case) 245 × 460 × 550 mm
Weight of loudspeaker (packed in carrying case) 21 kg

KAT-14 Auto-transformer. The Auto-transformer permits adjustment of voltage variations of supply mains ranging from 65 to 130 V for 127 V mains, and from 165 to 230 V for 220 V mains.

The Auto-transformer is equipped with a voltmeter for control of voltage at the output terminals.

Power of Auto-transformer 750 W
Overall dimensions of Auto-transformer 155 × 285 × 390 mm
Weight of Auto-transformer 13 kg

ЭПН-2 Screen. Light and portable, the ЭПН-2 suspension 2,600 × 1,900 mm screen is most convenient for motion picture showings with the "Ukraina" Projector. The efficient screen surface is coated with a diffusing and reflecting barite layer which ensures a reflection factor of 0.7 to 0.75.

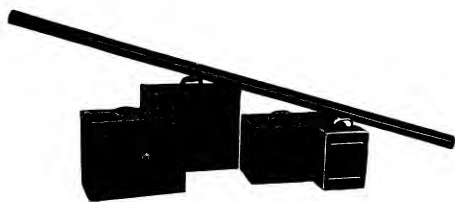


Fig. 74. Sound-on-Film Projector "Ukraina", packed in cases

Light in weight and simple in design the Screen can be quickly hung up for showings and as quickly taken down.

Overall dimensions of Screen (packed in jacket) 100 × 100 × 2,700 mm
Weight of Screen 14 kg

A view of the complete "Ukraina" Sound-on-Film Projector set packed in carrying cases is shown in Fig. 74.

Total weight of the "Ukraina" Sound-on-Film Projector... 99 kg.



KПC-M 35-mm PORTABLE SOUND-ON-FILM PROJECTOR

The improved Portable KПC-M Sound-on-Film Projector (Fig. 75) is designed for demonstrating 35-mm black-and-white and colour films.

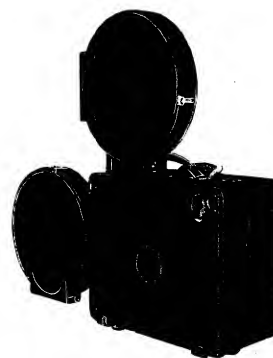


Fig. 75. KПC-M Sound-on-Film Projector

Reliability of the Projector design has been tested by operation in conditions of prolonged travel. This and splendid visual and sound projection plus ease in handling all mechanisms places the projector among the best in its class (Fig. 76 and 77).

A new design of the picture frame correction device has noticeably reduced wear of film and ensures steadiness of screen picture.

Use of ball bearings and high quality heat-treated material ensure lasting trouble-free operation of the projector.

The Projector is successfully employed in auditoriums with a seating capacity of 200 and is installed directly in the auditorium, eliminating the need of a special projection booth. This and other features make it particularly suitable for use in schools, clubs and village motion picture theatres.

SPECIFICATIONS

Power supply — from 110 or 220 V 50 cycle A.C. mains. Voltage variations in the mains are controlled by a special auto-transformer.

The Projector is supplied with two powerful specially-coated projection lenses with 52.5-mm diameter, relative apertures of 1:1.9 and 1:2.1, and focal lengths of 90 mm and 120 mm respectively.

Efficient illuminating power of Projector 250 to 300 lumens
Light source 400 W, 30 V (type K-22) projection lamp

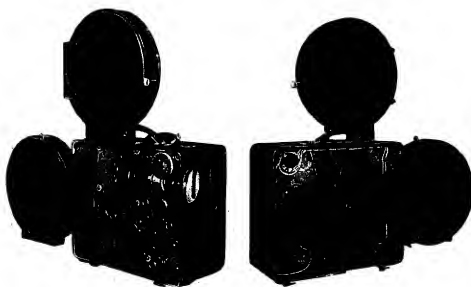


Fig. 76. KIIC-M Sound-on-Film Projector, right-side view with cover removed

Fig. 77. KIIC-M Sound-on-Film Projector, left-side view with cover removed

A 3 W, 4 V exciter lamp for scanning the sound track has a prefocusing socket which ensures perfect alignment of incandescent filament and sound track without adjustment when replacing lamp.

The exciter lamp is power-supplied from D. C. line.

Illuminating lamp of Projector — 8 W, 110 V.

The single-stage antimony-cesium photo-electronic multiplier of the $\Phi 9V-1$ type used in the Projector possesses great sensitivity, uniformity of characteristics, a low noise level and outstanding spectral characteristics, which ensure splendid sound reproduction of colour film sound tracks.

Power drive — single-phase, asynchronous, 50 W, 1,425 r.p.m. motor of ДЮ-50 type.

Deviations in vertical steadiness of image in picture frame gate — not exceeding 0.04 mm, in horizontal steadiness — not exceeding 0.02 mm.

Magazines have film capacity of 300 metres.

Tripod, film rewinding device, tools and necessary spare parts are supplied with the KIIC-M projector.

The KIIC-M projector is supplied with either a 4-KY-12 amplifying unit with loudspeakers (Fig. 78), or KIIV-50 amplifying unit with loudspeaker (See fig. 72).

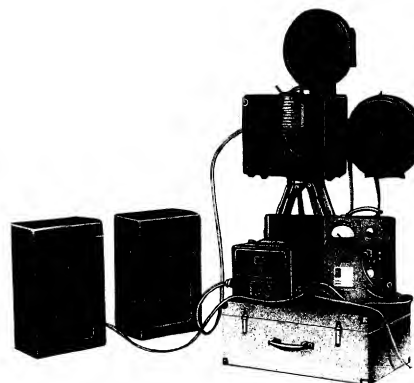


Fig. 78. KIIC-M Sound-on-Film Projector, complete set

Nominal output volume of amplifiers 10 W

Peak output volume 15 W

Reproduced range of frequencies . . 80 to 6,000 cycles

Amplifiers 4-KY-12 and KIIV-50 are supplied with the following electronic tubes and auxiliary lamps: 6Ж-7, 6H9M, 6П3, (2 pcs.), 5И4С, MH3 (neon indicator), MH-15 (6.3 V, 0.28 A incandescent lamp for KIIV-50 amplifier only).

The amplifiers have a selenium rectifier which supplies power to the Projector's 4 V, 3 W, D. C. exciter lamp.

The amplifiers enable playing of gramophone records with the aid of pick-up.

Power consumption of projector — approx. 660 W.

Amplifiers, connecting cables and accessories are provided with carrying cases for storage and transportation convenience.

OVERALL DIMENSIONS AND WEIGHTS OF PROJECTOR SET:

Projector with cover (220 × 415 × 420 mm)	27 kg
Auto-transformer with cover (155 × 390 × 285 mm)	13 kg
Case with accessories (260 × 460 × 625 mm)	23 kg
Tripod (folded) (220 × 220 × 1,300 mm)	5 kg
Case with loudspeaker (4-KV-12) (250 × 340 × 540 mm)	21 kg
Case with loudspeaker and amplifier (4-KV-12) (250 × 340 × 540 mm)	27.5 kg
Case with amplifier (KITV-50) (295 × 410 × 560 mm)	25 kg
Case with loudspeakers (KITV-50) (245 × 460 × 550 mm)	21 kg

The Sound-on-Film Projector KIIC-M is shown packed in carrying cases (amplifier excluded) in Fig. 79.

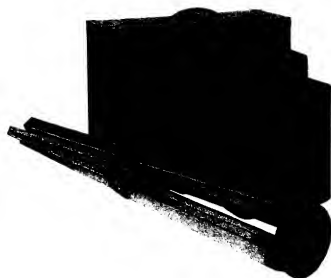


Fig. 79. KIIC-M Sound-on-Film Projector, packed in carrying cases

KIIT-1 35-mm STATIONARY SOUND-ON-FILM PROJECTOR

The modern sound-on-film projector must produce bright and sharp images and provide clear and undistorted sound.

The KIIT-1 Stationary Sound-on-Film Projector (Fig. 80) meets these requirements in full. It is intended for visual and



Fig. 80. KIIT-1 Sound-on-Film Projector

sound projection from 35-mm film with standard sound track. By special order the Projector may be supplied with KVCY-52, K3BT-3 sound reproducing devices.

Fig. 81 shows projector head, and Fig. 82 — its kinematic diagram.

The projector possesses the following advantages:

High standard visual projection. The specially-coated projection lens produces pictures uniformly sharp in screen centre as well as screen edge.

Uniform illumination of screen is ensured by a special sphero-elliptical mirror fitted in the arc lamp.

The powerful arc lamp with high-intensity carbons provides a light flood through film gate (shutter open; without film) sufficient to illuminate a screen area of 30 sq. metres at approx. 100-lux illumination.

Use of automatic carbon feed in the arc lamp eliminates any perceptible flickering in screen illumination.

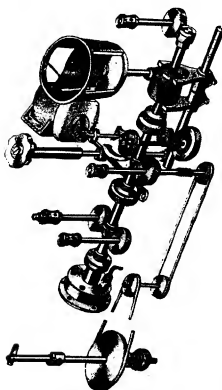


Fig. 82. KIIT-1 Projector Head, kinematic diagram



Fig. 81. KIIT-1 Projector Head

Perfect steadiness of screen picture is ensured by a long film channel with lateral registration and a rigid film aperture frame.

Warping of the film in the film aperture is prevented by a heat-protection filter installed in the film channel.

High Fidelity Sound. Adequate sound optics provide sufficient brightness to the sound slit.

An oil stabilizer ensures perfect uniformity of film speed past the sound slit.

Greater Film Protection. While travelling through the Projector the film is not subjected to undue strain.

A heat protection filter placed in the path of the light beam in the film channel and a cylindrical shutter between filter and channel prevent excessive heating of the film.

Fire protection is ensured by automatic fire shutters in shutter box and film channel during breakdowns.

Ease of Operation. Precise alignment of picture frame and film aperture during film threading is made easy by an 8 W, 110 V pilot lamp. A second pilot lamp, which is automatically switched on when the lamphouse gate is open, facilitates maintenance of arc lamp.

Carbons are fed automatically. Maintenance of the arc lamp is also facilitated by projection of the positive carbon crater image on the lamphouse screen.

A wide range of feeds and feed ratios of positive and negative carbons, and independent and simultaneous adjustment of carbons by hand permit use of various types of high-intensity and plain carbons.

Fire channels can be opened to clean out the carbon deposits.

Cleaning of film channel is facilitated by the easily detachable aperture framing.

On the side of the operator the space between lamphouse and lens is closed off by the shutter box and lensmount shutter.

All projector and arc lamp controls are conveniently located and provide ease of operation.

Long Service. Automatic lubrication of the Projector Head mechanism is effected by circulating oil.

The Projector Head mechanism is hooded.

Complete Fire Safety. Fire safety is achieved by:

- a) fireproof magazines with fireproof channels;
- b) automatic safety shutter in film channel which works when film breaks in path between film channel and drum of the maltese cross mechanism;
- c) governor controlled automatic safety shutter in shutter box;
- d) heat protection filter which eliminates infra-red spectrum portion of the light beam.

SPECIFICATIONS

The KIIT-1 Projector is adapted for use in club and theatre auditoriums with seating capacity of 2,000.

Operated on high-intensity carbons with an axis brilliancy of 36,000 stills, the Projector has an illuminating power of 3,000 lumens.

The film run is not enclosed.

The film guides in the film channel are replaceable. Lateral film vibration is limited by cushioning spring insert. Dimensions of film aperture are 20.9 x 15.2 mm.

Cooling of the light beam falling on the film aperture of the film channel is achieved by a heat protection filter cooled by the shutter. Light transmission factor of filter — 84%.

Intermittent movement of the film is produced by a maltese cross mechanism.

Perfect central registration of picture frame and aperture is assured. The shutter has cylindrical shape. Shutter light efficiency factor is approximately 0.5.



The sound reproducing system is equipped with a smooth-surface drum with oil speed stabilizer.

Exciter lamp — 50 W, 10 V.

Dimensions of sound slit — 2.15×0.02 mm.

Photoelectronic multiplier — type $\Phi 3Y-1$.

Type II-4 projection lens has relative aperture of 1:2. Focal lengths — 9, 10, 11, 12, 13, 14, 15, 16, 18 cm. (Projector is supplied with one of the lenses at purchaser's choice). Lenses are of specially-coated type. Their light transmission factor is 85–88 %.

Power drive for Projector's mechanism is provided by three-phase asynchronous 0.25 kW, 1,400 r.p.m., 127/220 V, 50 cycle electric motor of II type.

Automatic lubrication of Projector Head mechanism is achieved by geared oil pump.

Automatic rewinding is of the dry friction type.

Projection light source — an arc lamp of the mirror type. The sphero-elliptical mirror has a 360-mm diameter.

High-intensity carbons: the positive carbon with 8-mm diameter, negative carbon with 7-mm diameter.

Operation of lamp is achieved by direct current not exceeding 65 amps, voltage at terminals of lamp — 36–40 V.

The carbons are fed automatically. The positive and negative carbon feed ratio ranges from 1:6 to 1:1.

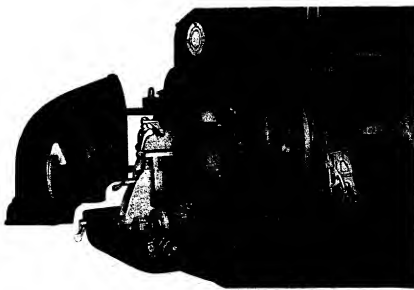


Fig. 83. KIIT-1 Projector Arc Lamphouse

Carbon feed mechanism is driven by 36–40 V, approx. 15 W D.C. motor. Speed range of motor, controlled by rheostat, is from 3,000 to 2,000 r.p.m. Motor switches on automatically by means of relay on striking the arc.

The carbon holders are solid cast. The positive carbon holder is adjustable for carbons of various diameters. The position of the negative carbon head is also adjustable. Correct building-up of arc is ensured by energized magnetic arc control. Additional two-way shifting of the negative carbon holder allows for handling of abnormal crater formation.

The lamphouse (Fig. 83) has double lateral doors which slide up when the lamphouse opens.

Kinematic diagram of the arc lamp is given in Fig. 84.

A baffle is provided to control ventilation in the hot-air exit pipe.

The glowing carbon tips are projected by means of an optical system on a screen fitted in the upper part of the lamphouse. This affords visual control of the arc gap.

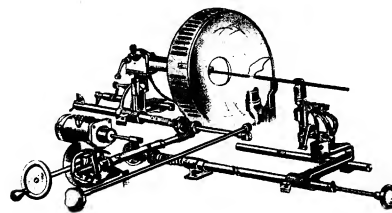


Fig. 84. KIIT-1 Projector Arc Lamp, kinematic diagram

The lamphouse pilot lamp operates on 100 or 220 V current and has an E-27 socket.

Upward and downward tilting range of the Projector optical axis is 6° and 17° respectively.

Capacity of reels up to 400 metres of film

Overall dimensions of Projector . . . $640 \times 1,300 \times 1,880$ mm

Height of optical axis from floor level 1,250 mm

Weight of Projector 300 kg



K3BT-3 SOUND-REPRODUCING AMPLIFYING DEVICE

The new model of the K3BT-3 Sound-reproducing Amplifying Device reproduces sound records from 35-mm film and is adapted for work with pick-up.

The amplifying device is designed for large motion picture auditoriums with 1500 seats.

The two-band Sound-reproducing Device ensures faithful reproduction.



Fig. 85. 50V-4 Amplifier



Fig. 86. 30A-9 Loudspeaker

The two-band amplifying system divides the sound frequency band into high-frequency and low-frequency circuits at the input and achieves subsequent amplifying of the signals in two narrow strip bands whose output is directly connected with high- and low-frequency two-way loudspeakers.

The outstanding features of the device are: practically no distortion, high output volume, low level of interference, uniform distribution of sound over entire auditorium, and highly reliable performance.

The Sound-reproducing Device consists of the following units: two 50V-4 amplifiers (racks), (Fig. 85); one of these is a spare unit;

two 30A-9 two-way loudspeakers (Fig. 86);

three 80V-3 photo stages fitted on projectors;

a 25A-3 monitor loudspeaker (Fig. 87);

two 6K-78 volume control resistors.



Fig. 87. 25A-3 Monitor Loudspeaker

SPECIFICATIONS

Nominal output volume of amplifier — 40 W.

Reproduced frequency range — from 40 to 10,000 cycles.

Within this range the nonlinear distortion factor does not exceed 2 %.

Power supply — from 50 cycle A.C. mains with 127 or 220 rated voltage. Range of voltage regulation is from 85 to 135 V and from 170 to 220 V respectively. Connection of device to line is single-phased.

Power supply of the exciter lamp is by rectified and well flattened current. Power of exciter lamp — 50 W, 10 V.

The device operates with three stationary KIIT-1 Sound-on-Film Projectors, of which two are operated and one is a spare unit.

Correction of high and low frequencies within operating range is possible.

Supply voltage of the photoelectronic multiplier — 230 V \pm 10 %.

Resistance of volume control — 10,000 ohms \pm 10 %.

Types of tubes and lamps used:

in amplifier — 6X7 (12 pcs.), 6H8C (6 pcs.), 6I13 (4 pcs.), 1-807 (16 pcs.), 5I14C (6 pcs.), 5I13C (4 pcs.), BI-176 (4 pcs.), MH-7 (4 pcs.), MH-3 (4 pcs.), incandescent lamps 6.3 V, 0.28 A (4 pcs.);

in photo-cell stage — 6X7 (3 pcs.);

in volume control panel — 5 W, 110 V, incandescent illumination lamp.

The loudspeaker units are adapted to Separately reproduce high and low portions of the operating frequency range.

The loudspeaker set includes two speaker units:

a) low frequency unit, consisting of electrodynamic head of low-frequency speaker (2pcs.), low frequency horn and directional baffles (right and left);

b) high frequency unit, consisting of electrodynamic head of high frequency speaker (2 pcs.), and high-frequency multicellular horn.

Rated output power of set 20 W

Frequency of division 550 ± 50 cycles

Average response of set not lower than 35 units

Directional characteristic variations do not exceed 5 db at 8,000 cycles frequency within a horizontal 80° angle and a vertical 50° angle.

Divergence of response does not exceed ± 6 db.

KVCY-52 SOUND-REPRODUCING AMPLIFYING DEVICE

The Stationary Sound-reproducing Amplifying Device KVCY-52 is designed to reproduce sound tracks of 35-mm film and is adapted for work with pick-up.

The amplifying unit is adapted for operation in motion picture theatres and club halls with a seating capacity of 800.

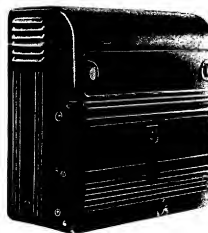


Fig. 88. 70Y-5 Amplifier



Fig. 89. 10K-4 Junction Box

The Device includes the following units:
70Y-5 Amplifier (Fig. 88) with hose and 10K-4 junction box (Fig. 89);

22B-3 Rectifier (Fig. 90);

10B-1 Rectifier (Fig. 91);

6K-16 Volume Control Panel (Fig. 92);

6Y-12 Dividing Filter;

25A-3 Monitor Loudspeaker (Fig. 93);

30A-3 Two-way Loudspeaker (Fig. 94).

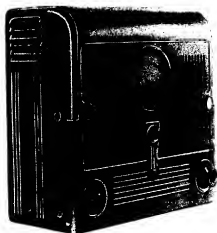


Fig. 90. 22B-3 Rectifier



Fig. 91. 10B-1 Rectifier



Fig. 92. 6K-16 Volume Control Panel



Fig. 93. 25A-3 Monitor Loudspeaker



Fig. 94. 30A-3 Two-way Loudspeaker

SPECIFICATIONS

Output volume of amplifier — 40 W.

Band of reproduced frequencies ranges from 60 to 8,000 cycles.
Nonlinear distortion factor when operating at rated volume does not exceed 2.5% in the 70–5,000 cycles frequency band.

Power supply — from A. C. single-phase 50 cycles mains of 127 or 220 voltage.

Regulation of the voltage supply is achieved by the 22B-3 Rectifier, which maintains normal operation of the device when voltage in mains falls from 127 to 85 V, or in 220 V mains to 170 V.

The exciter lamp is supplied with rectified and well flattened current. Exciter lamp — 10 V, 50 W.

The device is designed for use with two projectors; two devices may be used with three projectors of the stationary KIIT-1 type and the ФЭУ-1 photoelectronic multipliers.

An easy switch-over is ensured to the spare amplifying unit, and a spare KIIT-1 projector by the wiring scheme.

High and low frequency correction is provided within operating frequency range.

The 30A-3 Two-way Loudspeaker can reproduce high and low frequencies separately and represents a combination of two specific loudspeakers — of high frequency and low frequency response. Division of the operating frequency band is achieved by the 6V-12 Filter, inserted between the 70V-5 Amplifier and 30A-3 Loudspeaker.

Loudspeaker's maximum excitation power (at 25 V excitation voltage) is 65 W.

Photoelectronic multiplier power supply voltage — 230 V \pm 10%.

Resistance of volume control — 30,000 ohms.

The following types of tubes and lamps are used:

in 70V-5 Amplifier — 6Ж7 (2 pcs.), 6Н7 (2 pcs.), Г-807 (4 pcs.), 5Л4С (2 pcs.), MH-3 neon tube;

in 22B-Rectifier — BT-176, 6.3 V, 0.25 A tube;

in 6K-16 Volume Control Panel — 8—15 W, 110 V panel illuminating lamp.

Specifications of Two-way Loudspeaker:

Rated volume of output 20 W

Division frequency 650 cycles

Deviation of frequency characteristics within operating frequency

range not exceed \pm 8 db.

Average irrelative response of

Loudspeaker not less than 22 units

Directional characteristics of Loudspeaker lie within an angle of \pm 40° with response divergencies not exceeding 6 db. in the frequency band up to 6,000 cycles.

Overall dimensions of the Device:

70V-5 Amplifier 418 \times 398 \times 200 mm

22B-3 Rectifier 418 \times 398 \times 200 mm

10B-1 Rectifier 232 \times 280 \times 130 mm

6V-12 Dividing Filter 214 \times 158 \times 158 mm

6K-16 Volume Control Panel 214 \times 158 \times 158 mm

30A-3 Two-way Loudspeaker 730 \times 1,600 \times 700 mm

Weight of sound-reproducing device 187 kg



PY-65 SWITCHING RACK

The PY-65 Switching Rack (Fig. 95) is used in motion picture theatres and is designed for switching, protection and wiring of power and acoustic power supply lines of units (in projection booth and auditorium).

The design provides easy access to the terminal board, fuses and contactors.

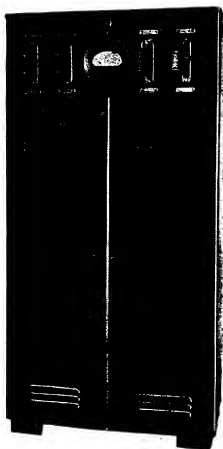


Fig. 95. PY-65 Switching Rack

A TC-5 Light Dimmer is installed in the top part of the Switching Rack structure.

The Switching Rack provides for an independent supply of power and light from two separate inputs: "power input" and "illumination input".

The Switching Rack has switching of supply circuits for projector arcs and allows switching of an operating projector arc from one supply circuit to another.

The control panel with a voltmeter is located on the front panel of the Switching Rack at a height convenient for operation.

The electric wiring diagram provides:

- power input switch;
- three throw-over switches for three-phase on-and-off switching of the auditorium illumination circuit;
- interconnecting means of two rectifiers and three projectors;

means of quick connection of any of two operating rectifiers to the third spare projector;

possibility to substitute the third (spare) BC-60A rectifier for any of the two operating rectifiers by means of a terminal board switch;

contactors to switch the rectifiers to the power supply circuit, the contactors being controlled from the projectors; fuses.

SPECIFICATIONS

The Switching Rack is designed to switch 220/380 V, 50 cycle A. C. line circuits.

Normal operation is maintained with voltage variations of + 10% and - 20%.

Overall dimensions of Switching Rack 1,450 X 740 X 440 mm

Weight of Switching Rack 150 kg



KAT-14 AUTO-TRANSFORMER

The KAT-14 Auto-Transformer (Fig. 96) is designed for portable 16- and 35-mm sound-on-film projectors equipped with 400 W, 30 V projection lamps, the power supply coming from a single-phase 127-220 V, 50 cycle, A. C. line.



Fig. 96. KAT-14 Auto-Transformer

The Auto-Transformer's voltage is adjusted by means of a rotary switch without interrupting the electric circuit. The Auto-Transformer is supplied with voltmeter.

Protection from short-circuit is achieved by a fuse.

Switch, voltmeter, fuse and receptacles for connecting cables are mounted on the Auto-Transformer panel and have a hood to protect them from mechanical injuries during transportation.

The Auto-Transformer is adapted for use in various branches of industry for maintenance of constant voltage values of 110 V, 30 V and 5 V.

SPECIFICATIONS

Rated power 750 W
 Rated output voltages 110 V, 30 V, and 5 V \pm 2.5%
 Ranges of voltage variations:
 for 127 V mains from 65 to 130 V
 for 220 V mains from 165 to 230 V
 Rate of voltage adjustment registered
 by voltmeter 12 steps of 5-7 V each
 Maximum overheating of winding 65° C
 Overall dimensions of Auto-Transformer 390 X 285 X 155 mm
 Weight of Auto-Transformer 13 kg



TPД-50 REACTIVE ARC TRANSFORMER

The TPД-50 Reactive Arc Transformer (Fig. 97) supplies motion picture projector arcs with stabilized alternating current.

The Reactive Transformer cuts power consumption to half compared to consumption through a ballast (active) resistance.

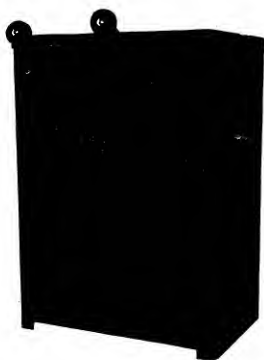


Fig. 97. TPД-50 Reactive Arc Transformer

The Transformer is provided with a steel housing. To ensure cooling of Transformer the housing is perforated and its bottom is open.

Connection of arc lamp to line circuit is achieved through two single-pole arc current regulation switches and terminals which

are mounted on a panel on top of the Transformer. The panel is protected by the housing cover.

The circuit diagram of the Transformer is shown in Fig. 98; external characteristics in Fig. 99.

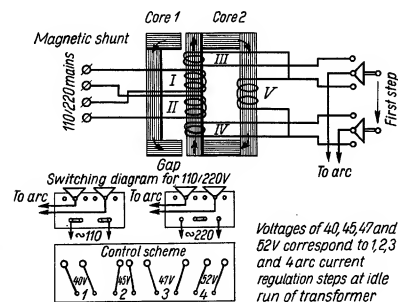


Fig. 98. TPД-50 Transformer Circuit Diagram

The switches regulating arc current have four steps. Apertures for the leads from "line" and "to arc" are provided in the side walls of the housing.

The Transformer is easily mounted on the projector base.

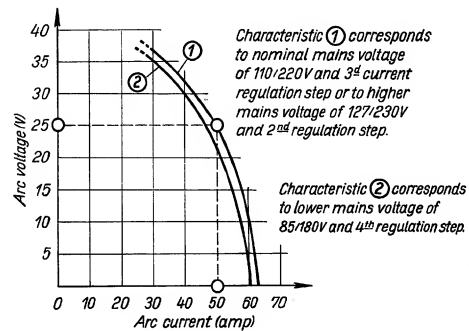


Fig. 99. TPД-50 External Characteristics of Transformer

SPECIFICATIONS

Power supply line of transformer

Rated voltage 110/220 V
 Frequency 50 cycles
 Phases 1
 Efficiency 0.8
 Power factor 0.5
 Tolerated variations in supply voltage:
 110 V line from 85 to 127 V
 220 V line from 180 to 230 V

Power supply line of arc

Rated arc voltage 20—30 V
 Rated arc current 50 A
 Rated load 1,500 W
 Stability of arc current at variations
 of arc voltage from 20 to 30 V . . . 50 : 5 A
 Tolerated range of arc current re-
 gulation from 40 to 55 A

Other data

Operating cycle 20-minute interval after 25-minute
 operation time
 Dimensions of transformer (without
 switch handles) 430 × 320 × 230 mm
 Overall dimensions of transformer
 (with switch handles) 450 × 320 × 285 mm
 Weight of transformer 45 kg

ЭИИИ PORTABLE DIFFUSE REFLECTION SCREEN

The portable hang-up screen (Fig. 100) is best suited for film showings indoors (club auditoriums, special demonstrating rooms, etc.).

The screen is hung up on the wall or on other support by rope rings at any desired height from floor level.

The screen is easily and quickly mounted before showing. It is light in weight and simple in design.

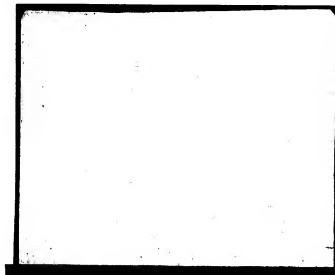


Fig. 100. ЭИИИ Portable Diffuse Reflection Screen

A special mechanism performs unwinding and rolling up of screen.

The screen is made of seamless linen fabric coated with special light-reflecting layer.

The screen is provided with a jacket for convenient transportation and storage.

SPECIFICATIONS

The portable screen is made available in two models:
 ЭИИИ-1 with efficient surface 2,000 × 1,500 mm
 ЭИИИ-2 with efficient surface 2,600 × 1,900 mm
 Screen reflection factor 0.7—0.75
 Overall dimensions and weight of the folded screen:
 Length ЭИИИ-1 ЭИИИ-2
 Diameter 2,100 mm 2,700 mm
 Weight 90 mm 100 mm
 Weight 9 kg 14 kg

TC-5 LIGHT DIMMER

The TC-5 Light Dimmer (Fig. 101) produces smooth dimming and gradual lighting of auditorium.

The Dimmer is an electromagnetic device of static action. All parts of the Dimmer are stationary and not subjected to wear. This outstanding feature places it above all other types of dimmers.

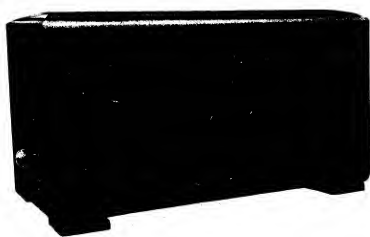


Fig. 101. TC-5 Light Dimmer

Dimming and lighting is achieved automatically on turning a switch handle.

The Dimmer is made available in two models:

- a) for connection to three-phase 127 or 220 V 50 cycle line;
- b) for connection to three-phase 220 or 380 V 50 cycle line.

SPECIFICATIONS

Rated load 5 kW
Minimum load 2 kW

Normal operation of the Dimmer is maintained at uneven inter-phase load distribution ranging up to 10% and at line voltage variations within limits of -20% and $+5\%$ of its rated value.

Lamp voltage drops from 80 to 20% of its rated value during dimming process. The process takes 25—45 sec. Lamp voltage rises from 20 to 80% of its rated value to accomplish lighting process in no more than 25 sec.

The Dimmer is designed for mounting in top part of PY-65 Switch Rack or independent installation on bracket or table. Cooling is effected by surrounding air. Air temperature must not exceed 35°C and relative air moisture must be not over 70%.

Overall dimensions of Dimmer . . . 760 × 400 × 430 mm
Weight of Dimmer 150 kg



A3C-9-10 AUTOMATIC FIRE SHUTTERS

The A3C-9-10 Automatic Fire Shutters are designed for installation in projection booth to shut off projection aperture and projection booth windows automatically during fire emergency within booth. The booth is thereby isolated from auditorium and flame and smoke are prevented from reaching the auditorium. A fire alarm and emergency lighting are switched simultaneously.

The Automatic Fire Shutter set (Fig. 102) includes equipment for two projectors:

Two automatic shutters with special protective glass for projection apertures, type A3C-9;



Fig. 102. A3C-9-10 Automatic Fire Shutters

Two automatic shutters with special protective glass for projection booth windows type A3C-10, and push-button switch;

Two automatic AB3-3 switches.

The automatic switch is fitted in the projector near the film channel and if film ignites, it achieves automatic disconnection of the power supply line of electromagnets working four automatic shutters.

The ЭИУ-1 power supply device feeds circuits of the automatic shutter electromagnets with rectified current and achieves switching of emergency lighting and fire alarm.

The ЭИУ-1 power supply device has a handle for manual switching of the emergency lighting and is provided with pilot lamps.

The B-16 push-button switch is fitted at exit of booth and serves for manual switching off of supply to electromagnets of the Automatic Shutters if fire breaks out.

SPECIFICATIONS

Power supply — from single-phase 110, 120 or 220 V, 50 cycles A. C. line. Normal operation of the device is maintained with variations of line voltage ranging from -20% to $+10\%$.

The device is designed for permanent connection to line. Surrounding air temperature must not exceed $+35^{\circ}$ and relative air moisture not over than 75% .

The design of the device's separate elements allows for combined operation of one, two or three projectors, effected by automatic shutters.

The power supply device is designed to feed the emergency lighting circuit up to 500 W lamp power.

The rectifier consists of BC-45-70 selenium bridge and TP-220 transformer. It is designed to supply electromagnets of 6 automatic shutters.

Dimensions of the shutter aperture — 150×150 mm.

The A3C-9 Automatic Shutter glasses are of the specular type with 85% transparency.

Overall dimensions of the Automatic Shutter:

A3C-9 $480 \times 240 \times 50$ mm

A3C-10 $480 \times 240 \times 130$ mm

Weight of set of Automatic Shutters approx. 25 kg



J13-2 AUTOMATIC SCREEN CURTAIN WINCH

The J13-2 Automatic Winch effects opening and closing of the screen curtain used for dual purpose of decorating screen and protecting it against dust and dirt.

SPECIFICATIONS

Range of regulating curtain opening — from 1 to 10 metres.
 Speed of curtain's travel — 0.2 metres per sec.
 An electromechanical control device effects remote operation of the winch from one or several locations.
 The starting device consists of magnetic starters with push-button controls.
 Power of electric motor is 0.52 kW.
 Power supply — from 220 or 380 V A.C. mains.
 A hand drive is provided to adjust and check operation of the winch mechanism.
 Overall dimensions of the winch . . 600 × 500 × 308 mm

ΦC-5 FILM STORAGE CONTAINER

The ΦC-5 Film Storage Container is two-storied and has twelve separate sections provided with lugs for rolling out film reels.

A special film humidifying device in the Container ensures film preservation.

"KIEV-1" MOBILE POWER PLANT

The "Kiev-1" Mobile Power Plant (Fig. 103) is designed to feed portable projectors of the KИC-M, "Ukraina" or of similar types with single-phase alternating current.

The power plant may also be used to feed the lighting system and instruments if their power consumption does not exceed 750 W.

The power plant has small dimensions and light weight. These features add to its mobility.

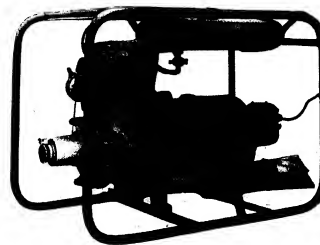


Fig. 103. "Kiev-1" Mobile Power Plant

The power plant consists of a single-phase alternating current generator and a two-stroke cycle internal combustion engine, attached to the generator by a special flange.

A flexible coupling transmits rotary motion from engine to generator. The generator and engine are mounted on a framework which protects the plant from damage.

A fuel tank of approx. 5-litre capacity is fitted in the upper part of the framework.

GENERATOR SPECIFICATIONS

The 9M-3 Generator is a self-exciting single-phase A.C. electric machine, and has the following characteristics:

Voltage	115 V
Current	7 A
Power	750 W
Frequency	50 cycles
Revolutions per min.	3,000

ENGINE SPECIFICATIONS

The engine is single-cylinder, two-stroke cycle, internal gasoline combustion, with two-channel scavenging.

Constancy of speed is maintained by a centrifugal governor set for 3,000 r.p.m., which corresponds to frequency of 50 cycles.

Power (at rated 3,000 r.p.m.)	2 h.p.
Cylinder bore	52 mm
Piston stroke	58 mm
Capacity of cylinder	123 cm ³
Rate of compression	6.5
Fuel	gasoline and oil compound in 1:25 ratio
Ignition system	M-24 magneto
Spark plug	M14 × 1.25 type HA 11/10
Carburettor	K-30
Cooling	air-cooled
Overall dimensions of power plant	750 × 400 × 480 mm
Weight of power plant	60 kg

A set of accessories and tools packed in a special box are supplied with the power plant.

KЭC-5 MOBILE POWER PLANT

The KЭC-5 Power Plant (Fig. 104) is designed to supply 35-mm or 16-mm motion picture projectors of KIIC-M, "Ukraina" or of similar types with single-phase alternating current.

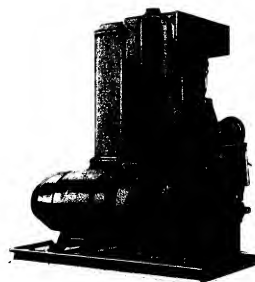


Fig. 104. KЭC-5 Mobile Power Plant

The power plant may also be used to feed the lighting system and instruments if their power consumption does not exceed 750 W.

The power plant contains an internal combustion engine which drives a single-phase alternating current generator by means of flexible coupling.

Engine and generator are mounted on a rigid base frame.

To facilitate transportation the power plant may be mounted on four wheels.

Regulation of voltage of power plant is achieved by a shunt rheostat mounted in the generator panel.

ENGINE SPECIFICATIONS

The JI-3/2 engine is vertical, single-cylinder, four-stroke cycle, gasoline-operated. Centrifugal governor set for 1,500 r.p.m. maintains constancy of speed.

Power (at rated 2,200 r.p.m.)	3 h.p.
Cylinder bore	65 mm
Compression rate	4.5–5.0
Capacity	298 cm ³
Cooling — thermosyphon, capacity of tubular radiator	5 litres
Fuel supply	by gravity
Fuel tank capacity	4.3 litres
Fuel consumption	up to 335 gr per h.p. per hour

Lubrication	..... splash type
Lubrication system capacity	..... 1.7 litres
Magneto	..... type M27B
Spark plugs	..... M-12/20 type
Carburettor	..... K-12 T type
Overall dimensions of engine	..... 760 X 520 X 510 mm
Weight of engine	..... 61 kg

GENERATOR SPECIFICATIONS

The 9M-1 generator is self-exciting, single-phase A. C. electrical machine.

Voltage	..... 115 V
Current	..... 7 A
Power	..... 750 W
Frequency	..... 50 cycles
Revolutions per minute	..... 1,500
Exciter voltage	..... 32 V
Exciter current	..... 3.5 A
Shunt rheostat resistance	..... not less than 4.2 ohms
Overall dimensions of generator	..... 480 X 300 X 260 mm
Weight of generator	..... 42 kg
Overall dimensions of power plant	..... 1,200 X 665 X 950 mm
Weight of power plant	..... 180 kg

A ballast resistance to maintain load when the projector is being switched off, a connecting cord, special tools, a set of spare parts and other accessories are supplied with the Power Plant.



K9C-4 MOBILE POWER PLANT

The K9C-4 Mobile Power Plant (Fig. 105) is designed to supply projector installations with two projectors of the KIIC-M, "Ukraina" and of similar types with single-phase alternating current.

The power plant is installed in a special room fitted for operation of internal combustion engine.

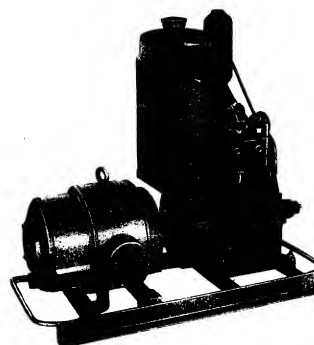


Fig. 105. K9C-4 Mobile Power Plant

The power plant includes an internal combustion engine which drives a single-phase alternating current generator by flexible coupling. Engine and generator are mounted on a rigid base frame.

The power plant is provided with a switchboard installed in the power plant room, and with switchbox, mounted in proximity of projectors.

The switchboard has a voltmeter for visual control of power plant voltage, fuses, switches and plug sockets. The switchbox is also provided with fuses, switches and plug sockets.

ENGINE SPECIFICATIONS

The Д6/3 engine is vertical two-cylinder, four-stroke cycle, gasoline-operated type. Constancy of speed is maintained by a centrifugal governor set for 1,500 r. p. m.

Power (at rated 2,200 r. p. m.)	6 h. p.
Cylinder bore	65 mm
Compression rate	4.5—5.0
Capacity	597 cm ³
Cooling — thermosyphon, capacity of tubular radiation	7 litres
Fan	with two blades
Carburettor	type K-12/I
Fuel supply	by gravity
Fuel tank capacity	15—18 litres
Fuel consumption	up to 335 gr per h. p. per hour
Magneto	type MM/C-2
Spark plugs	M 12/20 type
Lubrication	splash lubricator
Overall dimensions of engine	670 X 450 X 800 mm
Weight of engine	100 kg

GENERATOR SPECIFICATIONS

The АПН-28.5 generator is a self-exciting single-phase alternating current electric machine.

Voltage	120 V
Current	15 A
Power	1,800 W
Revolutions per minute	1,500
Frequency	50 cycles
Exciter voltage	54 V
Exciter current	3.6 A
Shunt rheostat resistance	21 ohms + 15 %
Weight of generator	75 kg
Overall dimensions of power plant	1,100 X 550 X 900 mm
Weight of power plant	230 kg

The power plant is supplied with ballast resistance to maintain load when shutting off projector, connecting cord, special tools, set of spare parts, fuel tank and other accessories.

**MEASURING AND INSPECTION
INSTRUMENTS**



16-MM-3 FILM LENGTH COUNTER

The Counter (Fig. 106) registers the length of 16-mm film. It is designed to operate on service benches with vertical rewinding devices with both forward and reverse run of film.

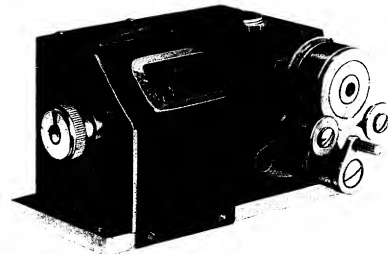


Fig. 106. 16-MM-3 Film Length Counter

A clearly visible dial shows length of film in hundreds, tens, ones and tenths of metres.

During forward run the counter adds the length of film, during reverse run it subtracts.

Overall dimensions of counter 119 × 106 × 68 mm
Weight of counter 1.2 kg

35-MM-3 FILM LENGTH COUNTER

The Counter (Fig. 107) registers the length of 35-mm film. It is designed to operate on service benches with horizontal rewinding devices with both forward and reverse run of film.

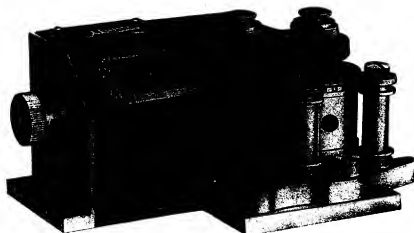


Fig. 107. 35-MM-3 Film Length Counter

The dial shows hundreds, tens, ones and tenths of metres during the forward run. During reverse run length of passing film is subtracted from previously registered length.

Overall dimensions of counter 137 × 106 × 80 mm
Weight of counter 1.5 kg

CO-301-1 FILM INSPECTION MAGNIFIER



Fig. 108. CO-301-1 Film Inspection Magnifier

The CO-301-1 Film Inspection Magnifier (Fig. 108) is adapted to define the degree of wear of 16 and 35-mm film perforations by alignment with a standard reticule put on the lens surface.

The eye-glass of the magnifier is fitted with a device for focusing a sharp image of the reticule in the ± 2 dioptric range.

The device is of the portable pocket type.

SPECIFICATIONS

Lens magnifying power 10 ×
Overall dimensions of Magnifier . . 100 × 80 × 35 mm
Weight of Magnifier 130 g

JIIIII-16 PERFORATION PITCH INSPECTION RULE

The JIIIII-16 Rule (Fig. 109) is adapted to measure the average perforation pitch and the average percentage of shrinkage in 21 picture-frame lengths of 16-mm film.



Fig. 109. JIIIII-16 Perforation Pitch Inspection Rule

The design of the Rule enables to define shrinkage ranging from 0.5 to 1.5 % and to inspect films of perforation pitch exceeding 7.62 mm.

Reading: of fixed scale 0.004 mm; of moving scale 0.05 %.

The Rule is of the portable pocket type.

Overall dimensions of Rule 150 × 50 × 20 mm
Weight of Rule 350 g

JIIIII-35 PERFORATION PITCH INSPECTION RULE

The JIIIII-35 Rule (Fig. 110) is adapted to measure the average perforation pitch and the average percentage of shrinkage in 3—8 picture-frame lengths of 35-mm film.



Fig. 110. JIIIII-35 Perforation Pitch Inspection Rule

The Rule is a metal plate with a film bed, pins to secure film, and scale for measuring pitch dimensions and shrinkage percentage.

The instrument is of the portable pocket type.

Overall dimensions of Rule 180 × 50 × 3 mm
Weight of Rule 50 g

ИКИ-2 PERFORATION INSPECTION PROJECTOR

The Perforation Inspection Projector (Fig. 111) is portable, bench-type, and adapted to define degree of wear in 35-mm film perforation tracks.



Fig. 111. ИКИ-2 Perforation Inspection Projector

The instrument projects the perforation aperture, film edge and sound track on a lens-screen.
A special reticule on the projector screen allows to define the degree of wear.

SPECIFICATIONS

Magnifying power of Projector . . . 7.6 — 8.6 X
Power supply . . . 127 or 220 V A. C. line
Illumination source . . . 4 V, 3 W lamp
Overall dimensions of Projector . . . 280 X 240 X 100 mm
Weight of Projector . . . 4.5 kg

ПИФ-3 SOUND TRACK MEASURING INSTRUMENT

The ПИФ-3 bench-type Measuring Instrument (Fig. 112) measures the geometric dimensions of the sound track and its position in relation to film edge.



Fig. 112. ПИФ-3 Sound Track Measuring Instrument

The instrument is adapted to control:
distance from sound track axis line to film edge;
width of band to be printed;
width of zero mark lines;
width of negative film sound track.

SPECIFICATIONS

Magnifying power of measuring instrument . . . 20 X
Power supply . . . 127 or 220 V, A. C. line
Light source . . . 4 V, 3 W lamp
Overall dimensions of instrument . . . 300 X 245 X 110 mm
Weight of instrument . . . 5 kg

IH-3 INSPECTION KIT

The IH-3 Inspection Kit (Fig. 113) is designed to facilitate inspection and control of motion picture projection installations, and projection apparatus in repair shops.

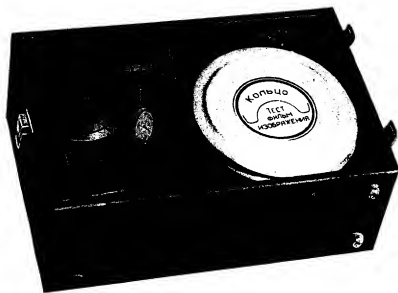


Fig. 113. IH-3 Inspection Kit

The kit allows for inspection of: the optical light system; radial or end run out of sprockets; axis play; stability of picture frame in the film channel; equalization of screen illumination from two projectors; film tensioning in film channel and film tensioning on take-up frictional device; degree of perforation wear; average perforation pitch; average percentage of film shrinkage; quality of sound and image; dimensions of film channel; position of intermittent sprocket; film gate position.

The complete kit comprises:

- a) for 35-mm sound-on-film projectors:
 - device for installation of optics;
 - instrument for defining sprocket run out;
 - gauges for film channel measurements;
 - masks for light control measurements;
 - dynamometer for measuring film tensioning in film channel;

dynamometer for measuring film tensioning in take-up frictional device;
 sound test-film;
 image test-film and film loop of 100 % fitness;
 125-mm vernier caliper;
 tape or collapsible meter;
 magnifier with mount;
 electric torch with battery;

- b) for inspection of 16 and 35-mm film perforations:
 - magnifier for perforation inspection;
 - 16-mm film perforation pitch inspection rule;
 - 35-mm film perforation pitch inspection rule.

The kit is provided with carrying case.

Overall dimensions of case 400 × 255 × 132 mm
 Weight of kit 7.5 kg



ДФЭ-2 PHOTOELECTRICAL DENSITOMETER

The ДФЭ-2 Photoelectrical Densitometer (Fig. 114) measures photographic densities in transmitted light. The instrument includes the following assemblies:

- Ferroresonance voltage stabilizer;
- optic system with lighting device;
- amplifier;
- mirror dial galvanometer;
- detachable carriage.



Fig. 114. ДФЭ-2 Photoelectrical Densitometer

The voltage stabilizer provides stability within 1% of the output voltage with line voltage variations ranging from 100 to 130 V.

The scheme of densitometer includes:

- СНБ-3 photoelectric cell;
- 6Ф5 electronic tube;
- 6 V, 15 W exciter lamp.

Measurements are facilitated by the detachable carriage construction. One measurement may be made within 2—3 sec.

The Densitometer makes possible special measurements of light intensity.

Easy access to parts of Densitometer is provided by removable lid of the instrument box.

SPECIFICATIONS

Power supply — from 120 V, 50 cycle A. C. line.

Reading of optical density values is achieved by means of galvanometer pointer deflections.

Galvanometer scale enables direct reading of optical diffusion density.

Optical density measurements from zero to 3.0 are made with an accuracy of:

- ± 0.01 with 0.0 to 1.0 density values;
- ± 0.02 with 1.0 to 2.0 density values;
- ± 0.03 with 2.0 to 3.0 density values.

Overall dimensions of Densitometer 570 × 320 × 360 mm

Weight of Densitometer 28 kg



ЭППИ-4 UNIVERSAL EXPOSURE METER

The ЭППИ-4 Exposure Meter (Fig. 115) is designed to determine exposure time when filming black-and-white and colour film, or photographing with day or artificial light.



Fig. 115. ЭППИ-4 Universal Exposure Meter

The instrument is portable, pocket-type, supplied with special handy carrying case.

The instrument consists of the following parts:

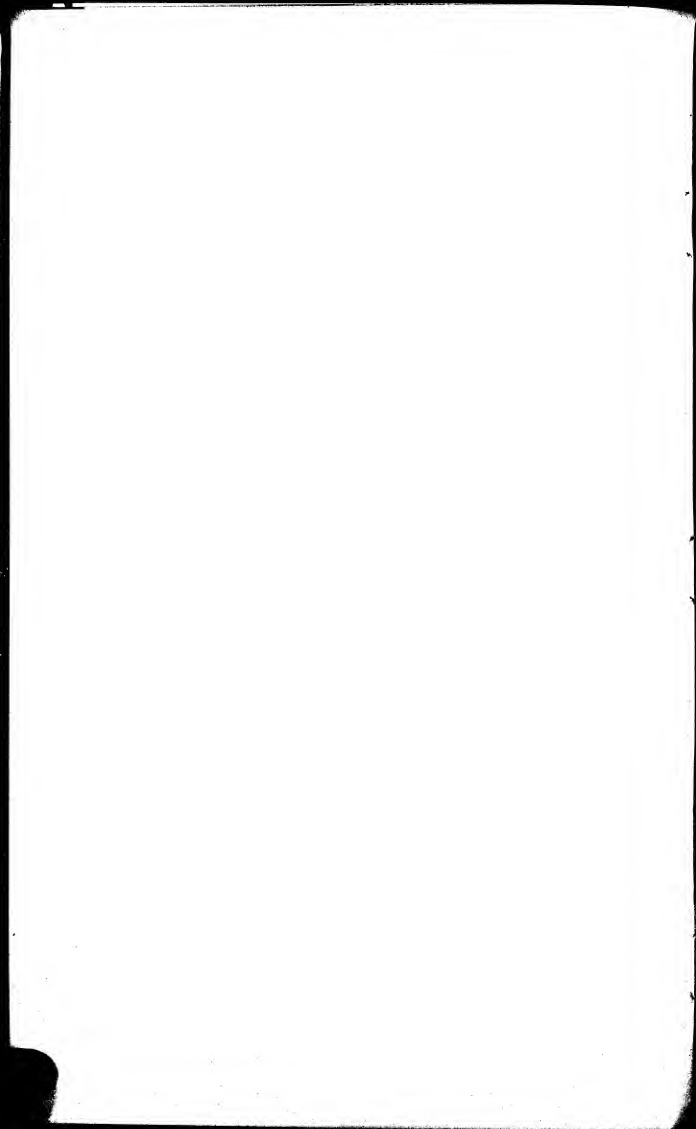
disk-shaped selenium photoelectric cell; iris diaphragm for adjusting magnitude of the light beam; two attachments: for light measurements and measurements of average and high brilliancies respectively; metering instrument with arrangement for locking of the pointer in the deflected position; calculator with three scales bearing values of exposure-determining factors.

The Exposure Meter consists of two parts — upper and lower, connected with each other by an axis which allows the upper part to move up to an angle of 300° in relation to the lower part.

SPECIFICATIONS

Range of illumination measurements	25—100,000 lux
Range of brilliancy	30—100,000 apostilb
Viewing angle during screen illumination measurements	170°
Viewing angle when measuring high and average brilliancy by use of attachment	50°
Measuring instrument	micro-ammeter of 1.5—10 ⁻⁴ response per mm of scale division and 650 ohm frame resistance
Overall dimensions of Exposure Meter	125 × 60 × 35 mm
Weight of Exposure Meter	300 g





LIGHTING APPARATUS



IIP-60 APPARATUS FOR DIFFUSED LIGHT ILLUMINATION

The IIP-60 Apparatus (Fig. 116) provides diffused light illumination for normal or newsreel filming.

The apparatus is used to illuminate backgrounds, large groups in foregrounds, sets and actors in action.

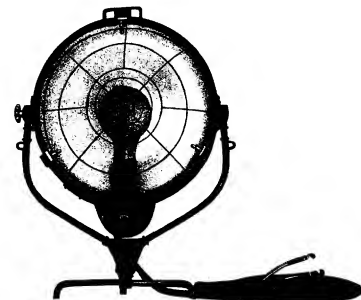


Fig. 116. IIP-60 Apparatus for Diffused Light Illumination

The apparatus is portable, safe in operation, simple in design and is used effectively in studio and outdoor sets.

The apparatus is fitted on a tripod or suspended by special attachments.

The apparatus is equipped with a protective wire grid which is quickly and easily attached to it.

A special cable is supplied with the apparatus. Its length is 10 metres.

A switch is provided for disconnecting the electric supply line.

A set of shutters (Fig. 117) may be supplied with the apparatus on special order.

SPECIFICATIONS

Light source incandescent 110 V, 5,000 W lamp, or
similar 3,000 W lamp
Diameter of reflector 600 mm
Maximum light intensity
(with 5,000 W lamp) not less than 30,000 candles
Angle of diffusion 160°
Reflection factor not less than 0.75
Overall dimensions of apparatus
(without tripod) 250 × 300 × 600 mm
Weight of apparatus 14 kg



Fig. 117. IIP-60 Apparatus for Diffused Light Illumination, with shutters

PD-5 APPARATUS FOR DIFFUSED LIGHT ILLUMINATION

The PD-5 Apparatus for Diffused Light Illumination (Fig. 118 and 119) is designed for general illumination of large sets indoors and outdoors. The Apparatus is suitable for black-and-white as well as colour filming.

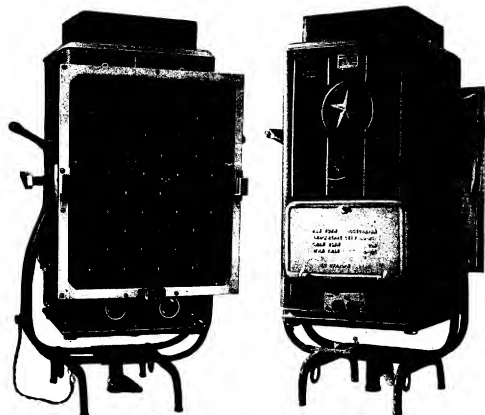


Fig. 118. PD-5 Apparatus for Diffused Light Illumination Fig. 119. PD-5 Apparatus for Diffused Light Illumination, rear view

The Apparatus includes the following assemblies:
apparatus body with arc lamp mechanisms and arcuated support;
reflector installed in frame;
diffuser with frame;
electric motors with reduction gearing;

voltage divider;
ballast rheostat;
10-metre length of connecting cord.

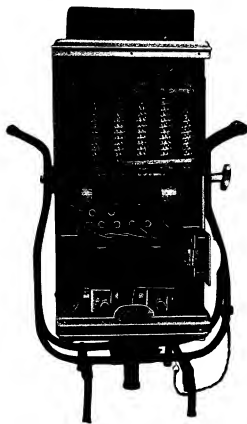


Fig. 120. PD-5 Apparatus for Diffused Light Illumination, rear view with cover removed

Automatic striking and constant operation of both arc lamps are maintained with two electric motors with reduction gearing (Fig. 120).

Styling of body and structural features provide maximum operating convenience.

Heat and sound insulation is ensured by asbestos sheathing of inner surface of body casing.

The apparatus is designed for use with tripod but may be operated set on floor or suspended. Tilting may be effected to an angle $\pm 60^\circ$.

Two series-connected arc lamps and reflector with light diffuser are supplied with the apparatus.

SPECIFICATIONS

Power supply — from 110—115 V D. C. line.

Conditions of arc lamp operation:

Voltage at each arc 34—36 V
Current 40—42 A
Maximum light intensity of spotlight 15,000 candles
Spotlight diffusion angle 130°

The arc lamp is designed to operate with carbons

type "P-49"

Positive carbon with 8-mm diameter and 300-mm length burns at rate of 110 mm per hour
Negative carbon with 8-mm diameter and 220-mm length burns at rate of 65 mm per hour

Distance of luminous centre of apparatus (less tripod) from floor level 520 mm
Overall dimensions of apparatus 450 × 560 × 925 mm
Weight of apparatus 54 kg

KПД-15 ARC LAMP SPOTLIGHT

The КПД-15 Arc Lamp Spotlight (Fig. 121) is designed for illumination of portrait subjects, defining details of filmed objects and producing exaggerated light contrasts during synchronous colour filming, etc.



Fig. 121. КПД-15 Arc Lamp Spotlight

The spotlight apparatus includes the following assemblies: spotlight with 150-mm diameter echelon lens; ballast rheostat; tripod; 10-metre length of cable for connection to mains; shutter and set of snouts, supplied for every five devices; set of spare parts.

Design and workmanship of tripod provide for smooth lifting and lowering of the extension rod, and easy, noiseless shifting of the spotlight.

Handling of spotlight, setting of lens into mount are effected quickly and easily.

The arcuated support allows endless horizontal motion over 360°; vertical tilting is possible up to 180°.
Locking devices secure the apparatus in any desired position.

SPECIFICATIONS

Power supply — from 110—115 V D. C. line.

Arc Lamp is designed to operate with:
type "8—40" positive carbon of 8-mm diameter and 220—330 mm length;
type "8—60" negative carbon of 7-mm diameter and 130-mm length.

Conditions of Arc Lamp operation:

voltage 30 V

current 30 A

Maximum light intensity 300,000 ± 10 % candles

Diffusion angle 7°

Overall dimensions of apparatus:

without tripod 300 × 400 × 470 mm

with tripod:
minimum height . . . 1,400 mm

maximum height . . . 2,100 mm

Weight of spotlight 13.5 kg

Weight of apparatus with tripod,
rheostat and shutters 39 kg

KИД-25 ARC LAMP SPOTLIGHT

The KИД-25 Arc Lamp Spotlight (Fig. 122) is designed for illumination for synchronous colour filming.

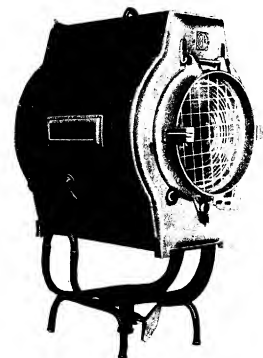


Fig. 122. KИД-25 Arc Lamp Spotlight

The Spotlight includes the following main assemblies (Fig. 123):
body with mount and 250-mm diameter echelon lens;
supporting device for installation and shifting of lamp along its optical axis;
apparatus control instruments;
arcuated support for mounting of apparatus;
semi-automatic intensity arc lamp with instantaneous arc lighting;
ballast rheostat with cable;
shutter and set of snouts (set supplied with every five devices);

10-metre length of cable with contactor for connection with ballast rheostat and switchboards;
set of spare parts and accessories.
Handling of spotlight, setting of lens in mount is effected quickly and easily.

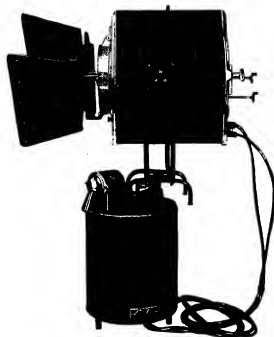


Fig. 123. KИД-25 Arc Lamp Spotlight, complete set

The arcuated support is designed to allow endless horizontal motion of 360°; vertical tilt is possible to an angle of 180°. Locking devices secure the apparatus in any desired position.

SPECIFICATIONS

Power supply — from 105, 115 and 125 V D. C. line.
The Arc Lamp is designed to operate with:
"11-75" positive carbon of 11-mm diameter and 400-mm length;
"Extra-K" negative carbon of 9-mm diameter and 165-mm length.
Conditions of Arc Lamp operation:
voltage 55 V
current 75 A
Maximum light intensity 1,000,000 \pm 20% candles
Diffusion angle 9°
Overall dimensions of apparatus
(without handles) 660 \times 590 \times 800 mm
Weight of apparatus 41 kg
Weight of rheostat with cable 19 kg



KИД-M ARC LAMP SPOTLIGHT

The KИД-M Arc Lamp Spotlight (Fig. 124) is used for synchronous black-and-white and colour filming indoors and outdoors.

The apparatus is adapted for illumination of actors and background settings, as well as distant sets.

The apparatus includes the following assemblies:
device consisting of arcuated support and cylindrical body with 500-mm diameter lens;



Fig. 124. KИД-M Arc Lamp Spotlight

semi-automatic intensity arc lamp with instantaneous arc lighting;
ballast rheostat with cable;
tripod;
shutter and snouts.

SPECIFICATIONS

Power supply — from 105, 115 or 125 V D. C. line;
Power consumption — 16 to 19 kW (depending on voltage);
Mechanism of Arc Lamp driven by D. C. motor.
The Arc operates with high-intensity "ПЛТ" or "ПЯ" carbons. The positive carbon with 16-mm diameter and 550-mm length. The negative carbon with 11-mm diameter and 220-mm length.
Conditions of Arc Lamp operation:
voltage 68—70 V
current 150 A
Continuous operation of Arc Lamp must not exceed 30 minutes.
Maximum light intensity 5,200,000 candles
Diffusion angle 8°
Overall dimensions of apparatus 1,655 × 800 × 2,260 mm
Weight of apparatus 95 kg



KILJ-25 INCANDESCENT LAMP SPOTLIGHT

The KILJ-25 Spotlight (Fig. 125) is used during indoor and outdoor filming for illumination of actors and sets as well as theatre and club stages.

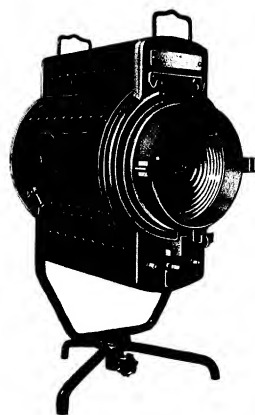


Fig. 125. KILJ-25 Incandescent Lamp Spotlight



Fig. 126. KILJ-25 Incandescent Lamp Spotlight, with stand

The apparatus consists of a cylindrical body with a 250-mm diameter lens, a focusing device for a 2,000 W, 110 V incandescent lamp, reflector, arcuated support and 25 A switch.

A stand (Fig. 126) and 15 metres of special $2 \times 4 \text{ mm}^2$ cable are supplied with the apparatus.

SPECIFICATIONS

Maximum light intensity¹ 279,000 candles
Diffusion angle¹ 15°
Overall dimensions of apparatus $610 \times 480 \times 800 \text{ mm}$
Weight of apparatus 24 kg

¹ The above characteristics are true when a 2,000 W, 110 V incandescent lamp of 23 lm/W light efficiency is used with the apparatus.



KILJI-35 INCANDESCENT LAMP SPOTLIGHT

The KILJI-35 Spotlight (Fig. 127) is used during indoor and outdoor filming for illumination of actors and sets, as well as theatre and club stages.



Fig. 127. KILJI-35 Incandescent Lamp Spotlight



Fig. 128. KILJI-35 Incandescent Lamp Spotlight with stand

The apparatus includes:
a cylinder with 350-mm diameter lens; focusing device for a spotlight incandescent 5,000 W, 110 V lamp; reflector; arcuated support and a 60 A switch.

A stand (Fig. 128) 15 metres of special $2 \times 16 \text{ mm}^2$ cable and a set of spare parts and accessories are supplied with the apparatus.

SPECIFICATIONS

Maximum light intensity¹ 500,000 candles
 Diffusion angle¹ 16°
 Overall dimension of apparatus . . . 690 × 570 × 930 mm
 Weight of spotlight 34 kg

¹ The above characteristics are true when a 5,000 W, 110 V incandescent lamp of 26.5 lm/W efficiency is used with the apparatus.

KILJ-50 INCANDESCENT LAMP SPOTLIGHT

The KILJ-50 Spotlight (Fig. 129) is for indoor and outdoor illumination of actors and sets as well as theatre stages.

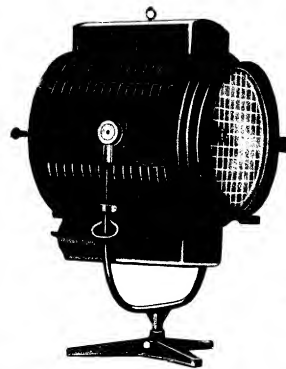


Fig. 129. KILJ-50 Incandescent Lamp Spotlight



Fig. 130. KILJ-50 Incandescent Lamp Spotlight, with stand

The Spotlight includes the following assemblies:
 cylinder with 500-mm diameter lens; focusing device for incandescent 5,000 or 10,000 W, 110 V spotlight lamp; reflector; arcuated support and special throw-over switch for starter resistance which reduces starting current when lamp is switched on. 20 metres of special 2×25 mm² cable, stand (Fig. 130), a set of spare parts and accessories are supplied.

SPECIFICATIONS

Maximum light intensity¹ 1,390,000 candles
Diffusion angle¹ 17°
Overall dimensions of apparatus . . 845 X 720 X 1,130 mm
Weight of apparatus 65 kg

¹ The above characteristics are true when a 10,000 W, 110 V incandescent lamp of 27.8 lm/W light efficiency is used.

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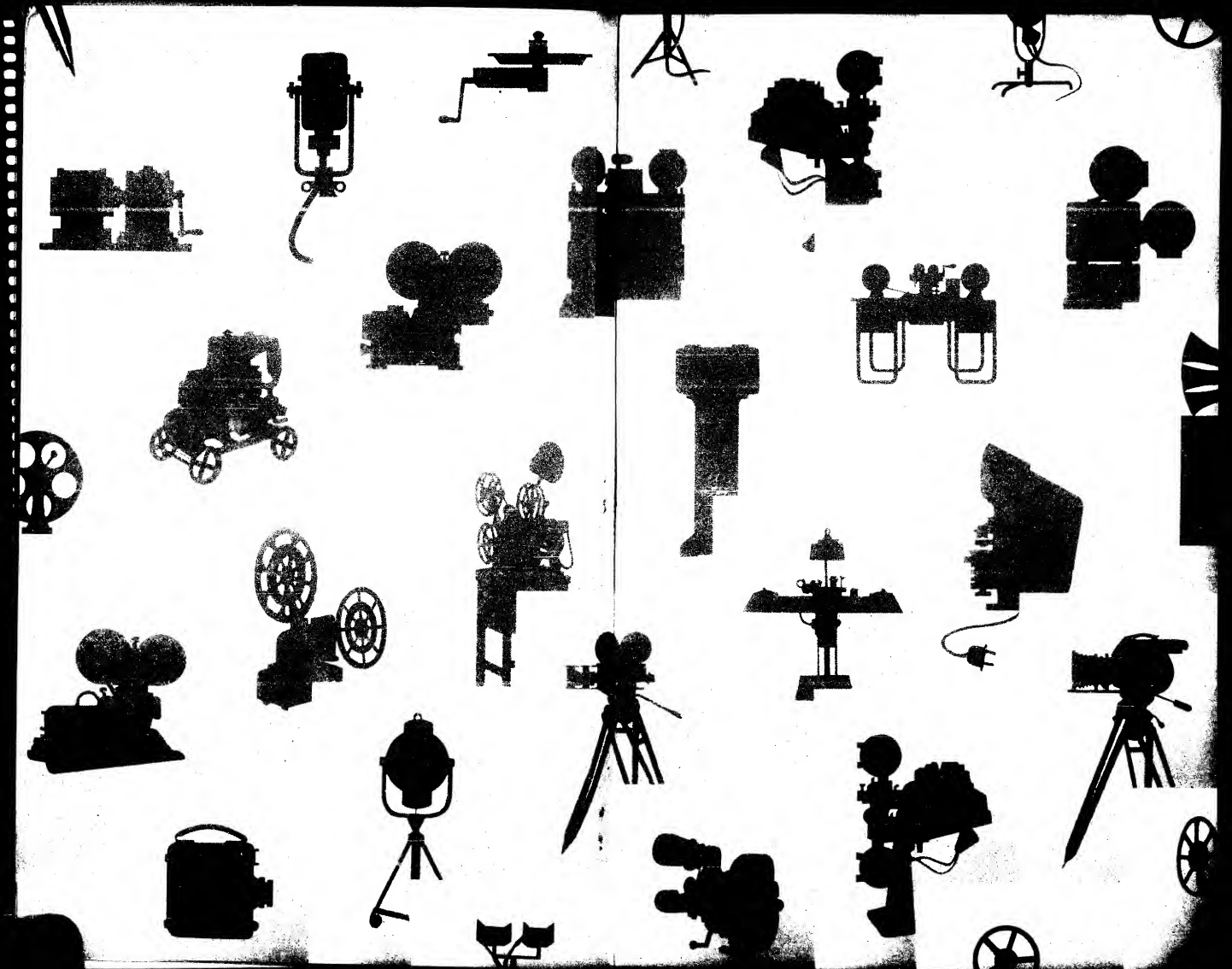
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Design and specifications of the equipment illustrated herein are subject to change without notice.

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